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»\*REPORT\*«

— OF THE —

NINETEENTH ANNUAL MEETING

— OF THE —

Vermont Dairymen's Association.

1889.



MONTPELIER:

PRESS OF THE WATCHMAN PUBLISHING COMPANY.

1889.

# THE BILLINGS FARM HERD

— OF —

## THOROUGHbred \* JERSEY \* CATTLE.

Have been carefully bred with a view to obtain the greatest amount of First-Class Butter from the least amount of feed. No animals are retained in the Herd unless they can demonstrate their ability to make 14 pounds of butter per week, at four years of age, on common feed.

The following list of Sires and Dams will show the quality of the young stock:

BLACK PRINCE, of Linden, who sold for \$15,000.

STOKE POGIS, of Linden, whose dam, Matilda 4th, has a record of 21 pounds 8 1-2 ounces of butter per week; 73 pounds 1 1-2 ounces per month; 16,153 3-4 pounds of milk, which made 972 pounds 8 1-2 ounces of butter in a year.



RIOTER'S PRIDE, the best living son of Stoke Pogis 3d, whose 27 tested daughters made an average of over 20 pounds of butter per week, each.

LE BROCCQ'S PRIZE, with 27 daughters and grand-daughters in the 14-pound list.

PET GILFORD, 17 pounds 8 ounces in seven days.

EUDORA, with a record of 16 pounds 2 ounces per week.

EUPHONIA, 16 pounds 1-2 ounce.

MATIN, the dam of Le Broccq's Prize, made 17 pounds 11 ounces of butter in seven days, at 10 years old.  See Cut, next page. 

LA VIOLETTE, 17 pounds 8 ounces in seven days.

STOKE POGIS REGINA, 18 pounds 3 ounces butter per week at three years old.

LADY JANE of St. Peters, 15 pounds in seven days.

The bull at the head of the Billings Herd (Garfield Stoke Pogis) out of the famous cow, Mollie Garfield, who made 22 pounds 12 ounces butter per week; averaged 9 pounds 3 1-2 ounces per week for 20 weeks, and in the same time gave five times her own weight in milk.

His sire, Exile of St. Lambert, is out of Allie of St. Lambert, who made 26 pounds 7 ounces butter in seven days, and 57 pounds of milk per day.


Bull calves by Garfield Stoke Pogis out of the best cows in the herd for sale at farmers' prices.

The Billings farm is also headquarters for registered Southdown Sheep and Berkshire Hogs.

*All inquiries relating to Stock will receive prompt attention if addressed to*

**GEORGE AITKEN, Manager.**

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 In answering Advertisements mention the Vermont Dairymen's Report.

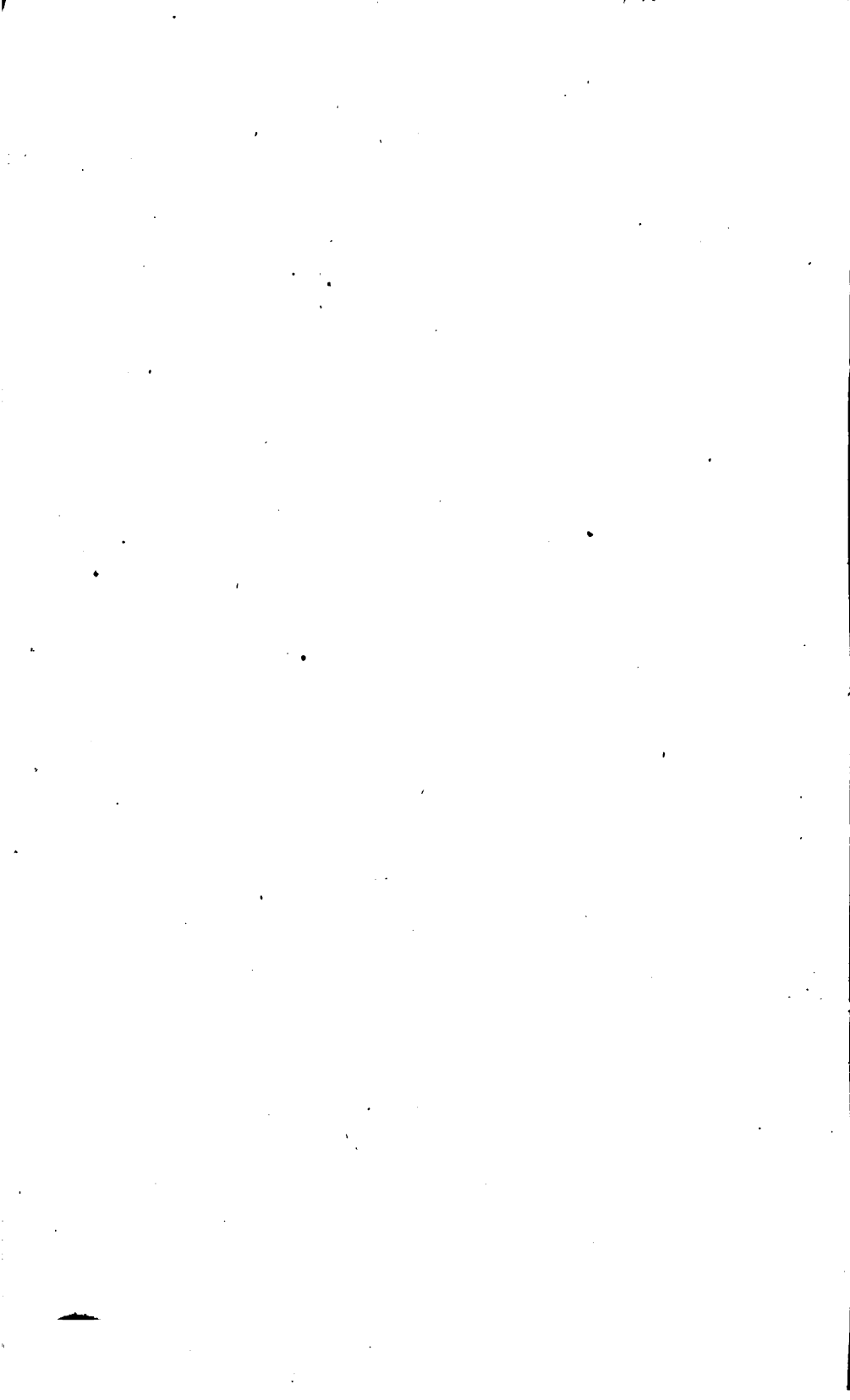


**MATIN, the Dam of Le Brocq's Prize, Made 17 lbs., 11 ozs. Butter  
in 7 Days at 10 Years Old.**





*Yours truly F. D. Douglass*





REPORT

— : OF THE : —

NINETEENTH ANNUAL MEETING

— : OF THE : —

VERMONT DAIRYMEN'S ASSOCIATION.

1889.

EDITED BY

*E. L. BASS, Secretary.*



MONTPELIER :

PRINTED BY THE WATCHMAN PUBLISHING COMPANY  
1889.

Sec 1644.8.5

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## OFFICERS

—: OF THE:—

### Vermont Dairymen's Association.

1889.

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PRESIDENT—O. M. TINKHAM, North Pomfret.

VICE-PRESIDENTS— $\left\{ \begin{array}{l} \text{HON. F. D. DOUGLAS, Whiting,} \\ \text{HON. ALNEY STONE, Westford,} \\ \text{W. W. DAVIS, Westminster.} \end{array} \right.$

SECRETARY—E. L. BASS, West Randolph.

TREASURER—H. W. VAIL, North Pomfret.

AUDITOR—F. L. HOUGHTON, Putney.

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### OFFICERS ELECTED AT THIS MEETING,

For the Ensuing Year.

PRESIDENT—HON. F. D. DOUGLAS, Whiting.

VICE-PRESIDENTS— $\left\{ \begin{array}{l} \text{HON. ALNEY STONE, Westford,} \\ \text{HON. J. C. OLIVER, Charleston.} \end{array} \right.$

SECRETARY—E. L. BASS, West Randolph.

TREASURER—H. W. VAIL, North Pomfret.

AUDITOR—E. O. STODDARD, Poultney.

## AN ACT TO PROMOTE THE DAIRY INTERESTS OF VERMONT.

*It is hereby enacted by the General Assembly of the State of Vermont :*

SECTION 1. The sum of one thousand dollars is hereby appropriated annually to the Vermont Dairymen's Association, for the purpose of promoting, developing and encouraging the dairy interests of the State.

The Auditor of Accounts is hereby directed to draw an order on the State Treasurer in favor of the Treasurer of the Vermont Dairymen's Association, for the first payment of this appropriation, on the first day of January, A. D. 1889, and annually thereafter so long as the conditions hereinafter provided shall be complied with.

SEC. 2. Said Vermont Dairymen's Association shall hold an annual meeting, continuing for at least three days, at some town or city in this State, of easy access to the people, and in some comfortable and convenient building ; and said meeting shall be open and free to the people of the State. At said meeting, the best available talent in the country shall be employed to teach and discuss the best methods of dairy farming, and subjects connected therewith; and at said annual meeting premiums shall be offered for the best dairy products of butter and cheese, to an amount of at least two hundred dollars; such premiums to be awarded by disinterested and expert judges, and paid by the Treasurer of said Vermont Dairymen's Association.

SEC. 3. The Secretary of said Vermont Dairymen's Association shall, in the months of February or March of each year, cause to be printed and distributed among the dairymen of this State, a report of the meetings of the Association. Said report shall contain at least one hundred pages of the addresses, discussions and other proceedings of the meetings; also the awards of premiums and the methods of manufacture of those products to which premiums were awarded. Three thousand copies of said report shall be for the people of the State and two hundred for the State Librarian.

SEC. 4. The Secretary of said Vermont Dairymen's Association, shall, on or before December 1, 1889, and annually thereafter, make a detailed and itemized account to the State Auditor of Accounts of the receipts and expenses of said Association, which account shall be approved and countersigned by the Treasurer and Auditor of said Association.

SEC. 5. If, in any year, it shall appear to the State Auditor of Accounts that any part of the preceding annual appropriation remains unexpended, or has not been honestly and judiciously expended, then such a part or amount shall be deducted from the order for the next succeeding annual appropriation.

SEC. 6. This Act shall take effect from its passage.

# CONSTITUTION.

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SECTION 1. This organization shall be called the "VERMONT DAIRY-MEN'S ASSOCIATION."

SEC. 2. Its objects shall be to improve the dairy interests of Vermont, and all subsidiary interests.

SEC. 3. This Association shall consist of such persons as shall signify their desire to become members, and pay the sum of one dollar, and a like sum annually thereafter, and of honorary and corresponding members.

SEC. 4. The payment of five dollars shall constitute a life member, or the payment of an annual membership fee of one dollar for five consecutive years, shall constitute a life member.

SEC. 5. The officers of the Association shall be a President, two Vice-Presidents, (one from each Congressional District), a Secretary, Treasurer, and an Auditor, who shall constitute the Executive Committee, and have the general oversight of all the affairs of the Association.

SEC. 6. There shall be held, during each winter, an Annual Meeting, at such time and place as the Executive Committee may designate, for addresses, discussions, exhibitions, and the election of officers, who shall hold their respective offices for one year, or until their successors are chosen. Said meeting shall continue in session at least three days.

SEC. 7. It shall be the duty of the Secretary to prepare an Annual Report of the transactions of the Association for the current year, embracing such papers, original or selected, as may be approved by the Executive Committee, and cause the same to be published and distributed to the Dairymen of the State of Vermont.

SEC. 8. The Treasurer shall keep the funds of the Association, and disburse them on the order of the President or a Vice-President, countersigned by the Secretary, and shall make a report of the receipts and expenditures to the Annual Meeting.

SEC. 9. This Constitution may be amended at any Annual Meeting, by a two-thirds vote of all the members present.

REPORT  
—OF THE—  
NINETEENTH ANNUAL MEETING  
—OF THE—  
Vermont Dairymen's Association.

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CITY HALL, BURLINGTON, VT., }  
January 16, 1889. }

The Nineteenth Annual Meeting of the Vermont Dairymen's Association was called to order by President O. M. TINKHAM, at 10:20 A. M., January 16.

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DECORATIONS.

The Hall had been tastefully decorated with pictures of noted Holsteins from Smiths, Powell & Lamb, of Syracuse, N. Y., of Jerseys on the Billings farm at Woodstock, and others from Moulton Brothers' Green Mountain Stock Farm at West Randolph; also with fancifully-arranged butter-working utensils, with sheaves of beautiful grasses, grain and fodder, with immense shields containing scythes, rakes, forks, etc.; and to complete the Hall's appearance, the wall back of the fine dairy implement display on the platform was covered with the American flag, in the midst of which, and surrounded by roots and grains, stood an old farmer labeled "1789." He was dolefully doing the week's churning with a dash churn, and looked down askance at the array of Cooley and Stoddard Creamers, the Lactonite, the Surprise and Davis Churns, the Butter-Workers, the Eclipse Corn Planter, Monitor Sowers, Hocking Valley Feed Cutter, Ferguson & Hopkins Water Heater, packages of Osgood's Butter Color Powder, and other modern labor-saving contrivances to which he appeared a stranger.

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THE PRESIDENT'S ADDRESS.

*Gentlemen of the Association:*

It is a source of great pleasure to meet so many of you here to-day, and of congratulation that we are convened for the first time relieved from the necessity of begging. I trust that with this meeting the Association will enter upon a new and more

prosperous era, by reason of the appropriation made at the last session of the Legislature; although, as I think, the results it has achieved in its work for the past twenty years have been second to that of none of the other Societies in the State.

Vermont has natural advantages, and she might rank as the first dairy State in the Union. She has made great advances, but has not yet reached a point where she can rest on her laurels, for she has more to gain in the future than has been gained in the past. The programme before you will give you a list of talent which is to address you—talent which it will be difficult to surpass—and in proceeding to the business of this occasion, I take pleasure in introducing to you Mr. D. M. Macpherson, of Lancaster, Ontario, who will address you upon the matter of cheese-making.

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### CHEESE MAKING.

Mr. Macpherson, who was very cordially received, said:

It affords me considerable pleasure to attend your Convention. Through the courtesy of your Secretary, an invitation was extended to me to be present to say a few words in relation to my experience in regard to the manufacture of cheese.

I am aware that the tendency in this State is largely toward the manufacture of butter, and I fear my remarks in regard to cheese-making will not have the interest for you they might otherwise have. But the two interests are closely identified, both articles being the product of milk. If it is all made into butter, it creates a surplus that tends to lower prices. By making part of the milk into cheese, it relieves the surplus of butter, and *vice versa*; and hence we get a fair average price on both articles. The question has often been asked me at Dairymen's Conventions, Which is the most profitable product to make? I believe there can be very little difference, where both products are made. If butter is higher in price than cheese, a quantity of milk will be taken from the manufacture of cheese and turned into butter, and *vice versa* if cheese would produce more profit than butter. Hence, the prices of the two articles have a tendency to bring about an equilibrium of value, so that when a first-class article of cheese and butter are made, there will be very little difference in the results as to profit of one or the other.

### DEVELOPMENT OF THE DAIRY INTEREST.

Dairying in this State, and, indeed, throughout this North American Continent, is developing to an immense magnitude. The value of the butter and cheese products of this country

will exceed that of any other two products combined. Such being the case, it is our bounden duty to consider the importance of dairying, and how to promote and increase its value. We have had to carry on the work almost single-handed, and without State or governmental aid; but we have just reached a condition of affairs where Legislatures and governments are beginning to recognize the importance of this industry, and are willing to help its interests with appropriations.

#### SCIENTIFIC EXPERIMENTS.

We find now that scientific men are interesting themselves in the matter, and by experiments are devising means of discovering the laws governing the results in our product.

#### QUALITY OF THE PRODUCT THE FIRST CONSIDERATION.

The value of butter and cheese is largely determined by the quality of the articles; hence the importance of producing the very best quality. Profits are determined by two conditions—quality and quantity. In making cheese, we can have quality at the expense of quantity, and very often have quantity at the expense of quality. The producer's aim should be, first—quality, thereby acquiring a reputation, and creating a demand for that product. Quantity should come next. Good quality will enhance the value by increasing the demand.

Cheese-makers should have a definite aim and object; this is one of the first elements of success.

When I started eighteen years ago, my aim was to produce a better article, and obtain a higher reputation; to know more about the science of cheese-making, and the products and requirements for success. Every cheese-maker should aim to secure all the practical knowledge bearing upon the question of the cheese product.

NO CHEESE-MAKER CAN PRODUCE A BETTER ARTICLE OF CHEESE THAN HE KNOWS HOW. THE MEASURE OF HIS RESULTS IS THE STANDARD OF HIS ABILITY. AFTER ACQUIRING THE KNOWLEDGE, THERE SHOULD BE AN INTELLIGENT APPLICATION OF IT.

The first of the requisites for success is a knowledge of the component parts of the product we handle.

Milk is largely composed of water—eighty-seven per cent.; butter, caseine and sugar; there are other small elements not necessary to mention, because we are dealing largely with butter, caseine and moisture. Milk is a fluid containing certain proportions of solids. Cheese is a solid, made up of the same component parts as milk; the only difference is a reduction of the moisture; out of eighty-seven parts of moisture, to convert

milk into cheese, we have to expel eighty-three to eighty-four parts. Cheese is affected by two agents—rennet and moisture; influenced by several others, largely heat and acid development. It is necessary to control these four conditions to produce that character and quality of cheese we wish to turn out. When we divide cheese making into two parts, and carry out the requirements of these two parts, then we have the conditions under control. In the manufacture of cheese, it is something like the feeding of cattle, or of plants. In making cheese, the manufacturer must be able to determine the character and requirements of his out-put, to make the greatest results; he must be able to control the conditions necessary for the successful results.

In the manufacture of cheese, sugar is an active agent, which upon being exposed to the air, is turned into an acid. This milk sugar is the most important element in the preserving of milk for the manufacture of cheese. Fermentation is a form of life developed, and where there is life there is preservation, and this sugar converted into acid creates life and preserves the milk from putrification or decay. It is important that the milk, when taken from the cow, should be thoroughly strained and well aired, so as to preserve it in the best condition for the manufacture of cheese. This is a matter that is neglected.

#### THE STRAINING AND AERATION OF MILK.

The proper aeration of milk will have an important bearing on the quantity and quality and flavor of the cheese. We know how necessary it is in the case of fresh meat to have it thoroughly aerated after slaughtering. It is just as material to treat milk in the same way.

We come now to the condition of the milk for the application of rennet. The action of it no man can explain, but we see the results. It changes the milk from a liquid to a solid. The rennet takes hold of the milk, thickens it, holds the cream in suspension, and the sugar and caseine in solution. After thickening it, the rennet gradually expels the moisture; then it is necessary to break up the curd into particles, so as to assist the rennet in throwing off the moisture, or whey. The application of heat stimulates this action of the rennet. From ninety-six degrees to ninety-eight degrees is the most favorable temperature for rennet to expel the whey or moisture. Care should be taken that the curd is broken up sufficiently. In many cases it is not broken up fine enough. In no case should it be over an half inch square. If it is in larger blocks or squares than five-eighths, the rennet has not the power of expelling the moisture, which will be retained to the injury of the quality of the cheese.



One great object of all cheese-makers should be to make a uniform curd, by having a uniform heat and uniform amount of moisture. If any particles of the curd get over-heated, or one part more than another, you will get imperfect results. No cheese-maker living can get a good uniform cheese, unless the curd is uniform; he cannot get a perfect cheese from an imperfect curd. What is an imperfect curd? It is one in which some of the particles contain more moisture than others.

I divide cheese making into two parts, and the critical part is the curd. A perfect curd must be secured for a perfect cheese. The particles of curd must not be allowed to settle. To obviate this, they should be kept in continual motion during the heating process, at the same time it should not be allowed; to receive injury from over-heat. If it is over-heated, it melts the butter out of the curd, and forces it into the whey, and it is lost.

#### LACTIC ACID.

There is a point I omitted to speak of in its proper place that is, the effect of lactic acid in the milk. When the milk is properly aerated, a certain amount of lactic acid is formed in the milk, but only to a small degree. This acid has the power of stimulating and strengthening the action of the rennet, and of holding the cream globules more perfectly to the curd. By having the milk thoroughly aired, so as to strengthen the action of the rennet in holding the butter globules, your standard of quality is kept up.

The stirring of the curd in the whey should be only sufficient to give a uniform heat throughout the mass, and to expel the moisture out of the curd.

#### DIFFERENT SYSTEMS—THEIR MERITS.

There are two systems of manufacturing cheese; one where the whey is allowed to remain on the curd for a considerable length of time after the acid develops; the other, called the English "Cheddar" system, of drawing the whey in the earlier stages. When the English system is used, more control is had over the results, because when the whey is drawn early, means are thereby taken to manipulate the curd and bring it to a perfect condition as regards moisture. If the whey is drawn off, and then the curd hand-stirred, continuously for awhile, the particles containing too much moisture are broken into, and the whey forced out, so as to form a perfect curd, preparatory to making and forming a perfect cheese.

I advise cheese-makers to take that matter into careful consideration, as to the time when to draw the whey. If the whey

is left on the curd for a longer time than the first development of acid, it is injurious. It should be tested on the hot iron by being drawn out in fine threads; all practical cheese-makers will understand the term. If it remains on the curd too long, the cheese will become brittle, and crack on the surface, and it will affect the flavor very materially. It can only be controlled by cutting the curd very fine. When the curd is brought to a perfect condition in the first stages of acidity, the only thing required is the acid development. The chemical combination of curd should be thoroughly understood by practical cheese-makers. It has three parts—moisture, butter and caseine—in nearly equal proportions. These three elements should be diffused through each other to form that fine silky texture which is found in cheese in its perfection. Without the proper formation and chemical combination, we can never have that character of cheese. To obtain this combination, the temperature must be kept under control

I find from experience, that it takes about three hours from the formation of curd to the formation of cheese. The one-third moisture, or whey in the curd, contains a certain proportion of sugar, which is converted into an acid and preserves the flavor and quality of the cheese. If there is too much moisture, there will be an excess of sugar, consequently, too much acid is developed. We all know the injurious effect of too much acid in the cheese. It causes a disintegration of the parts, instead of a combination of them. The water separates from the curd which remains undissolved and we have a sour cheese, of insipid flavor and poor quality.

#### THE AMERICAN SYSTEM.

I suppose most of the cheese factories here make on what is called the American system of hand-stirring the curd, leaving the whey on the curd, and drawing it off very rapidly, hand-stirring it, and then putting it to press very quickly. The great trouble in that case is that the curd is very fine, not uniform, and contains too much moisture; hence we have white specks and an imperfect cheese. Then there is a liability of a sour curd, which is the most objectionable cheese to-day in the market.

I would advise that the curd be stirred down to a uniform condition, then "cheddar" it, allow it to run or "pack" together. You can thus control the heat better, and have it more uniform. From ninety-six degrees to ninety-eight degrees is the proper temperature to develop the chemical combination, and it takes from three to four hours. This gives the cheese a preserving character.

## PREPARATION OF THE CURD.

We come now to preparing the curd. It is necessary to be cooled off, previous to grinding, so that the butter will not be forced out during the process of grinding. A great many imagine that the curd mill has a peculiar effect over the curd. The only advantage I find from its use is to prepare it for the salt in small particles, so that the salt is evenly distributed. It is not necessary to have the curd ground so fine as some makers think.

## GRINDING, SALTING AND MOULDING.

After the curd is cooled down from ninety-six or ninety-eight degrees to eighty-six or eighty-eight degrees, it is ready for grinding, and in half an hour after grinding it should be salted. Use two and one-half pounds of salt to one thousand pounds of milk, or one hundred pounds of curd; sometimes three pounds of salt will be necessary, according to the condition of the curd. Half an hour after salting, it is ready to be moulded into the cheese. It takes about four hours in the "cheddar" system, where the mill is used, from the first developing of acid to form the proper condition for the moulding of the curd into cheese. After the cheese is put into the hoop, it should not be pressed hard at first. Give it very slight pressure for the first hour or two. During the manipulation of the curd in grinding and salting and putting into the hoop, more or less of the surface of the curd is bruised, and if too severe pressure is applied, it will force out a portion of the butter. The curd should be allowed to remain without pressure until its surface heals over, and thereby the butter particles—the most important part of the cheese—are retained. Let it remain without pressure for half an hour, then apply, and gradually increase it.

I have now gone over the requirements of cheese-making from the milk to the cheese. I may have neglected to speak of several things that are of importance, and you can call my attention to any thing I have omitted.

In answer to several questions put to Mr. Macpherson by members of the Convention, he said: The hot iron test should be made before the whey is drawn.

Thorough aeration of the milk is necessary to "ripen" it. It ought to be well ventilated at the dairy, and after arriving at the factory if it can be kept for one or two hours at a temperature of ninety degrees, it will give a larger yield and a better flavor and texture. But we should have thorough aeration of our milk at the farm-house, so as to start the lactic acid, otherwise we have decomposition and decay. When we develop the tendency to lactic acid in the earlier stages, then we overcome the effect of decay.

## DANGER OF COOLING TOO RAPIDLY.

Milk should not be cooled too rapidly. If it is, the animal odors have no chance to escape, and are retained in the milk. To preserve the quality of the milk, and encourage the action of the rennet, and retain the greatest amount of butter globules in the curd, milk should be gradually cooled and well aerated. When you get a condition where lactic acid is developed, you can not get the acid of putrefaction or ferment.

Prevention is better than cure, and with the right class of lactic ferment we have no trouble with floating curds or bad flavored curds afterwards.

As to the action of rennet, more cheese is injured by too much rennet than by too little. Put it in at a temperature of eighty-four degrees. In making cheese for export, we do not use more than will form coagulation in twenty minutes at a temperature of eighty-four degrees. Some makers use double that amount of rennet, but it destroys the keeping quality of the cheese, and is liable to injure it materially.

*A Member*:—Is there a large amount of cheese spoiled by using old rennet? Should it be made fresh every day?

*Mr. Macpherson*:—By all means have your rennet perfectly pure and fresh. Prepare as much as you think you will need, and throw away what you do not use. Never use whey in the milk. Nothing is more objectionable. Pure boiled soft water should be used for soaking the rennet. The value of whey when it is fresh is underestimated. It can be brought up by the addition of linseed meal, boiled or ground, to the value of whole milk for calves, and by adding linseed meal and pea meal it makes a fine feed for fattening hogs.

That is the secret of success in farming—to be able to buy in the cheap market and sell in the dear. If you can buy a fat worth two cents, and sell another at twenty or twenty-five cents, you arrive at a principle that will develop the best results.

## BARN CONSTRUCTION.

The question of barn construction is an important one. It affects the results of the farm to a much greater extent than we give it credit. Dairymen and farmers generally consider winter as a great draw-back to their business. They say they consume in the winter what they earn in the summer. That is a wrong conception of agriculture. The farmer should consume in the summer what he produces in the winter. I hold that the winter work is one that determines largely the profits and results of the farm. The condition of an animal determines its product, whether in milk or beef. This "condition" of the

animal is determined in the winter, when it stores up health, strength and vitality.

There are only two products on a farm, namely, plant and animal life. The health and vigor of each is in large measure determined by the quality of food supplied to it.

Where is it that plant food is collected, and the animal developed in health and vigor? Is it not in the barn during the winter months?

If this be so, the matter of barn construction is of great importance. I have given the subject much attention, knowing it has a great effect on the result of my business. If the cows are in poor health, their yield will be small. I seek to get health and vigor in the animals, and to increase the fertility of the soil. To attain the latter end, there should be A SAVING OF PLANT FOOD OR FERTILIZER made in the barn. This should be the first element in the matter of construction; the second should be THE PROMOTION OF THE HEALTH OF THE ANIMALS; the third, THE SAVING OF LABOR, and fourth, CHEAPNESS OF CONSTRUCTION. Of the fifteen or twenty considerations, I resolve them down to these four.

I put the saving of plant food first, because it determines largely the product of the farm. The food of the plant must be taken to it; the animal has power of locomotion, and if it fails to find food in one place, it goes to another.

The health of the animal is determined by the food it eats, and also the air it breathes. Ventilation, therefore, is a matter to be attended to, and while it should have fresh air, it must also have warmth. All the excrements from the animal, liquid and solid, should be saved. In Holland, the liquids are calculated to be worth eleven to twelve dollars a year. In this country they are considered of no value, and I have known numbers of farmers who have bored holes in the floors of their barns, and made ditches to carry off the leakage that occurred during the spring months. There is no benefit to any one in that case, unless it is to the doctor and undertaker. It is highly prejudicial to health to let these elements be absorbed in the ground where they may permeate through to your wells. To let it go that way is calculated to produce nothing, unless it is diphtheria and kindred diseases.

#### ARRANGEMENT OF STABLES.

The basement of the barn should be used to take the deposits. It should not be exposed. The greatest curse of the land are those open, exposed barn-yards; there is more waste of plant food in this than in any other direction. Millions of dollars annually are wasted in this way. The stables should

be elevated. No perfectly ventilated stable can be had in the basement. Certain acids are thrown off from the lungs of the animals in breathing. The most poisonous is carbonic acid gas, which is dense, and falls down, while the lighter gases rise. There is no means of creating a current in the basement, unless it is done by machinery, and, consequently, these heavy gases remain to the injury of the health of the stock that is stabled in a basement. The most expensive ventilation is opening the doors and letting your cattle out to ventilate the stables. You must give fuel to the animal to make up lost heat. Every animal should have its proper amount of pure air every hour of the day. I have a place in front of each animal where the fresh air comes in, and above, over every six animals, is a ventilator to carry off the lighter, impure air, and in the rear of the cattle are places for the heavy gases to pass down into the basement. Pure air is supplied to each from spaces in the barn floor. The cattle are fed from the barn floor, the hay being above, and the grain on the sides.

There should be a place for straw as well as grain. The straw and ensilage are in front of each animal.

My barn is 78x100 feet, with the stable in the center, and double rows of cattle stand facing out toward the floors.

#### WE HUNG UP THE FORK AND SHOVEL.

long ago, so far as loading manure is concerned. The liquid runs off in troughs to a cemented reservoir, and the solid excrement is dropped through the floor on to a suspended platform which has a dumping device. It hangs high enough above the bottom of the basement to admit a wagon, or a Kemp Manure Spreader, and by raising a latch it is quickly dumped into it. There is one dumping floor for each two cows, and it will hold the accumulation for a month. We can load twenty loads of manure from them in ten minutes. The cost of this arrangement, in labor and material, was only thirty-five dollars for forty cows.

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#### AFTERNOON SESSION, 1:30 P. M.

#### WASTES OF THE DAIRY FOR CALVES AND PIGS.

Address by James Cheesman, Secretary of the New England Creamery Association :

In acknowledging the cordial greeting given him, Mr. Cheesman said :

*Mr. President, Ladies and Gentlemen :*

Allow me to express the great pleasure and satisfaction I feel in viewing this magnificent audience and at these appropriately decorated walls, a new and commendable feature in meetings of this kind.

#### REARING CALVES.

The proper use of skim-milk and buttermilk has been suggested as a partial remedy to the prevalent practice of raising ill-grown, or poorly-nourished calves and pigs. As there can be no right appreciation of the true value of foods without understanding something of their general composition, and the relative values of nitrogeneous and carbo-hydrates, or flesh-forming, and fat or heat-making constituents ; neither can we grasp the full meaning of the word food apart from its nutritive ratio, or the relation which the flesh-forming material bears to the fat or heat-producing substances.

This ratio is found by ascertaining how much digestible nitrogeneous constituents a food contains in proportion to the digestible starch and fats. The fats are multiplied by two and one-half ; the product is added to the starch, gum and sugar, and the total shows the quantity of carbo-hydrates. These are divided by the quantity of nitrogeneous materials. Foods having a high or close nutritive ratio, as skim-milk, buttermilk, gluten meal, linseed, cotton-seed meal and other substances, are called highly nitrogeneous, just as barley and corn are called starchy, because they represent the other extreme. The necessity of having a high or close nutritive ratio for feeding young stock, and more especially until it has completed the first year of life, as in the case of calves, point to skim-milk and buttermilk as among the cheapest articles, when used with flax seed and gluten meal, for rearing young stock. There is no lesson in farm life more impressive to a young mind than to see plants and animals growing from day to day under a rational system of feeding. A few years ago the principal cities of the world sustained an infant mortality of about fifty per cent. That is, more than half the children born died under five years, and less than a quarter lived to be one year old. This enormous mortality rate was due to improper feeding and lack of nutrition. We have all noticed the pale, bloodless cheek, flabby muscles and soft bones of babies fed on corn starch, in which milk formed but a small part of the ration, and the blooming face, firm muscles and hard bone of youngsters brought up on oat-meal and milk. There is but one law of nutrition for men and farm animals, and that is the due proportion and sufficient supply of those food principles which build up bone and muscle

at a steady rate of daily increase, and keep the animal in good health.

I have often asked that the female members of the family, especially the girls, interest themselves in growing up the young stock of the farm. The best lesson in calf-feeding is obtained by watching the young calf suck its dam for the first five or six days. Knowing the composition of the milk, it becomes easy to imitate it, when we have removed the butter fat for dairy purposes, by using flax seed with our skim-milk, after allowing the calf to suck the dam; or still better, to feed it from birth with the aid of one of the best constructed calf-feeders, feeding its own dam's milk for the first ten days at ninety-eight degrees. After this a gradual change should be made, by using a quarter of a pound of ground flax seed divided into four feeds a day. This should be boiled and reduced to a jelly, and mixed with five pounds of skim-milk per feed. If the animal has come from its dam in a healthy condition, it will probably have a good appetite and a vigorous stomach.

I assume that there is enough interest in this young animal to secure for it sympathetic care from its attendant; that it will have a warm, dry pen, be kept shaded from the scorching sun, and be equally provided against the cold blasts of winter. The daily growth from this point may vary from almost nothing to three pounds or more, according to food and care. Skim-milk and flax seed have the following

#### CHEMICAL COMPOSITION :

	Skim Milk.	Dry mat- ter per gal.	Flax Seed.	Dry mat- ter, 16 oz.
Water .....	90.00		12.30	
Fat or oil.....	.70	1 lb.	37.00	
Caseine or nitrogeuous matter.....	3.50		20.50	
Sugar .....	5.00			14 oz.
Starch, gum, sugar, etc.....			55.00	
Crude fibre.....			7.20	
Ash .....	.30		5.00	
	100.00		100.00	

Our calf needs about two and one half pounds of dry matter per day to enable it to support itself and grow. Twenty pounds of skim-milk yield two of dry matter, and we can use six ounces of flax-seed meal and two of oatmeal or gluten meal for the balance of the food. In feeding this mixture, let it always be borne in mind that the meals must be thoroughly cooked by boiling, and the skim-milk be heated, and the mixture fed at not less than a temperature of one hundred degrees. If the calf is doing well, the flax seed may be increased at the rate of a quarter ounce every day to provide for its daily increase. Let the scales be used often—if every day, well; but if not, at least every ten days, so that the growth may be closely meas-



ured, and the food be increased accordingly. When the milk falls off, a mixture of three parts flax seed, one part oatmeal and one part middlings may be used as a substitute at the rate of one and three-fifths ounces for every pound of milk taken away.

The question of dairy quality is largely determined by the continuous growth of the calf through infancy at a uniform rate. At six weeks old our calf should have increased one hundred and forty-five or one hundred and fifty pounds. If it has not already been taught to nibble grass or cut hay, moistened and softened with boiling water, the practice should be commenced now. From this time on, the dry matter of the milk, which is one-tenth, or the meals and cut dry fodder, may equal two and one-fourth to two and one-half per cent of the live weight of the calf. Make every effort to secure skim-milk, if only ten pounds per day, for let it always be borne in mind that ten pounds of skim-milk are equal in feeding value to eighteen ounces of flax seed when used alone, and it is worth fully twenty-five per cent more money when used with flax seed as suggested. The milk has a nutritive ratio of 1:1.9, while flax seed is 1:4.9. As the mean of these two is 1:3.4, ten pounds of skim milk and one pound of flax seed made into gruel, with nine pounds of water, gives us the best possible substitute for full, new milk.

How much of arrested development is due to irrational or shiftless modes of calf-feeding? If the child is father of the man, how much more true is it that the calf is parent of the bull or cow? At three months old, if we can still use ten pounds of skim-milk per day, we may supplement for flax seed, oatmeal and bran instead of middlings, and continue to gradually reduce the flax seed with a mixture of oatmeal and bran, sprinkled over some nicely cut clover or corn ensilage, roots or grass, making the diet as varied as possible, and maintaining a steady increase right along. If we have grown our calf well from a birth weight of seventy pounds, it should weigh at a year old at least six hundred pounds. At fourteen or fifteen months old, it may be bred to calve at two years. From service to two years old, its diet should be a growing ration, with a ratio of at least 1:5, consisting chiefly of bran and clover, green or dry. Besides providing for its growth, it has to forage for the nourishment of the foetus and to develop its dairy character, if it has promise of such; and if not, it should be killed when it has finished milking.

#### FEEDING PIGS BUTTERMILK.

A much better use is made of buttermilk by feeding it to pigs than to use it for calves, though I see no objection to using

it as calf food after the calves are ninety days old, if it be used in mixtures of meal and cut fodder. It is not advisable to use it alone. Its acidity and excess of nitrogen renders it a costly food. It may therefore be treated solely as a pig food, and will show a greater profit when so fed than by any other use that can be made of it. In compounding a ration with pea meal or gluten meal as the chief ingredients, we should need to distribute it evenly through green cut fodders, corn ensilage or roots, to ensure a good return. Properly used, these form two of the richest feeds in the market, having a nutritive value of 1:2.9.

While the nutritive ratio of a mixture is of primary importance in constructing a ration for the pig, or for any animal, it is not the sole consideration. To obtain the greatest amount of feeding efficiency from a given quantity and quality of food, we require to feed several, rather than few substances, each different in its mechanical form and chemical composition. This gives variety, the maximum of flavors, and best promotes the secretion of the digestive ferments, and the activity of the digestive organs. Let the fact that farm animals which we grow from birth are whatever we wish to make them, be strongly emphasized. With reference to pigs and their food, of which buttermilk is to form the main feature of the ration, I would remind you that the best men in the pork business to-day look forward to finishing off their porkers at six months old, and to aggregate one hundred and sixty pounds to one hundred and eighty pounds, live weight. There is only one way of doing this, and it need not prevent the pig getting a reasonable amount of exercise during the fattening process. The pig must, first of all, be regarded with as much respect and kindness as any other animal on the farm. While we may regard him as a consumer of bye products of the household, as kitchen wastes, dairy refuse, as buttermilk and whey, these should be fed fresh.

The habit of looking upon the pig to eat up filth from sour swill, foul buttermilk and whey, and, worst of all, the undigested droppings of other animals, is an abomination which every man claiming to be civilized should be ashamed of. The pig is the most rapid grower of all the animals on the farm, and therefore requires a ration rich in digestible nitrogen, fats and other carbo-hydrates. A cow feeding a calf seldom gives more than an increase of two pounds a day, live weight, to her offspring. A sow, only one-third the cow's weight, has to nurse from eight to ten pigs and to increase their weight at about four pounds per day, so that she must raise them from one-third the weight of a calf at birth—about twenty-five pounds a litter—to double the weight of a calf at six weeks old, and to a greater weight than herself with her first litter. Such a task as this

demands more intelligence and judgment than any other occupation on the farm. The sow's milk is, if she be properly fed, as rich as the best Jersey or Guernsey milk, having as high as eighteen per cent of solids, and from four to five pounds of dry matter per day in it. In fact, her daily milk yield, were she a cow, would place her high up in the list of fourteen pounds of butter per week animals. If she is 300 to 350 pounds, she must eat enough to support herself, which will require six pounds of dry matter a day, and more than one pound of dry food for every pound of dry matter in her milk.

This calls for a high nutritive ratio of 1:4.5, to 1:4 which should be made up of at least 20 pounds of skim milk per day. It will be safe to calculate about one-tenth dry matter from this article, and a nutritive ratio of 1:1.8. The following ration will be a fair provision:

Skim-milk, 20 ; flax-seed meal, 2 ; bran, 2 ; gluten and oats, 2 ; cut corn, 2 ; total, 28.

Repeated experiments prove that pigs consume as much as 3 1-2 pounds of milk per day the first week, and 7 pounds the second week. The appetites and growth of the pigs will soon show what change in this diet is needed by the sow to provide for increased growth. The whole profit of pig-feeding is in rapid and continuous growing. The food should be cooked, and the skim-milk be warmed before feeding. In addition, let the sow have 10 to 15 pounds of corn ensilage or roots, or a mixture of them, and in summer, exercise on pasture.

As our pigs grow, they will begin to help themselves, and at three weeks old, with the ordinary food. It is of importance not to give them acid milk until they are weaned, and have got established for twenty days on their new rations. If the sow is allowed to feed her pigs for seven or eight weeks, this will bring them to ten or eleven weeks before we can feed buttermilk usefully. The best German, English and American experience in pig-feeding gives us 1:3.5 to 1:4 to 1:4.5 as the most useful ratio in growing pigs from 50 pounds to 100 pounds, and from that to 140 pounds and 180 pounds. With 15 pounds of buttermilk per day, we have one and a quarter pounds of dry matter ; this, mixed with bran, ground oats and gluten meal in equal proportions, and fed at the rate of one and a quarter pounds of the mixture to 15 pounds of the buttermilk will give us from 14 ounces to 18 ounces of daily increase. Fed in this way, the buttermilk would prove to be worth 16 cents per 100 pounds, or two cents a pound for its dry matter, on a basis of eight per cent of solids.

The whole success of pig-feeding depends on the care in management, and the time taken to make a marketable pig of

170 pounds. There is no profit beyond this limit, as the cost of food increases so rapidly with each advancing ten pounds of live weight as to render the use of the scales, at least once every thirty days, an imperative necessity. Dr. Goessmann's four consecutive years' work in pig-feeding for profit is perhaps the most valuable of the kind in the world. By examining it carefully, we shall see how materially the quantity of food must increase after the first 100 pounds, and yet pigs marketed under 160 pounds do not yield so good a price as those between this weight and 170 pounds, which is the extreme limit for profitable feeding for pork.

## DAILY FOOD.

Live Weight Period, pounds.	Day's Feed.	Skim Milk, pounds.	Corn Meal, ounces.	Gluten Meal, ounces.	Bran, ounces.	Daily Increase, lbs. oz.	
25½	27	11½	10½				15
53½	13	14	13	4	2	1	2
70	49	13	22½	10½	10½	1	9
147	28	13	55¾	13½	13½	1	13
204							

These four feeding periods simply represent as many proportions in the mixtures, or nutritive ratios, which varied from about 1: 3 to 1: 4 1-4. The quantity of food was increased gradually according to the appetites of the animals. These rich feeding mixtures were adopted, first, because it was believed they would hasten the profitable production of lean pork; and, secondly, because the value of the manurial residues would be high, amounting in this case to 2 1-2 cents per pound of the dressed pork, which reduced its net food cost to 3: 39 cents per pound. The skim-milk was charged at 20 cents per 100 pounds; the cost of the gluten meal was \$22.50; bran, \$22.50, and corn meal was \$24 per ton. If we desire to increase the proportion of buttermilk in our mixtures and use bran only, then, we may do it in the following proportions for every increase of 50 pounds live weight from 30 to 160 pounds, fed gradually:

Weight, pounds.	Buttermilk, pounds.	Bran, pounds.	Probable daily increase, pounds. ounces.	
25	12	1		14
50	15	1½	1	2
100	24	2	1	8
150	24 or 30	4½ or 3¼	1	10

The larger quantity of buttermilk would be likely to give the best results. If it be desired to make suitable buttermilk and bran mixtures, with ten pounds of buttermilk as the basis, then the following scale may be used for each of the four periods; or, taking the average time of fattening at 109 to 120 days, then commence with 13 ounces of bran to 10 pounds of butter-

milk, increasing one ounce every twenty days, up to 100 pounds, and after that one ounce every ten days, 14, 15, 16, 17, 18, 20 ounces. This will be fed according to the appetite and digestion of the animals. The finishing stage will consume about 30 pounds of buttermilk and 4 pounds of bran daily. The pig should not require feeding more than 100 days to produce 150 pounds increase from weaning. This will depend on the suckling of the sow, and her food.

Dr. Goessmann's pork cost him 3.78 cents per pound, live weight, from 26 pounds to 204 pounds, or 178 pounds increase, at the prices named ; 2.23 pounds of dry matter produced one pound live weight.

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Mr. W. H. Bowker, of Boston, was then introduced, and delivered the following address :

### FERTILIZERS FROM THE MANUFACTURER'S STANDPOINT.

When Adam entered the Garden of Eden, six thousand years ago, more or less, he found a fertile soil, a profusion of fruits and flowers, and luxuries of nature. We are told that if he had been content with these luxuries God would not have put upon him the curse of earning his bread by the sweat of his brow.

Now I am one of those who believe it was foreordained that man should earn his bread by the sweat of his brow. God planted in him curiosity, and a thirst for knowledge ; hence, the first thing Adam did when he entered the Garden, was to taste of the forbidden fruit. He was seeking knowledge.

God also knew that as man sought knowledge, his wants would increase ; that he would in time consume the bounties of nature, and finally tax the fertility of the soil.

God also probably foresaw that as man was obliged to earn his bread by the sweat of his brow, there would develop in him a sense of greed, and that he would seek to profit, so far as he could, by his labors, forgetting the future and his obligations to posterity.

Man was created a social being, fond of society, and as society grew, men congregated together in large centres, and as they increased and multiplied, a greater tax was placed upon nature, and a greater waste ensued.

The Creator foresaw that cities would grow up which would draw on the fertile country for their support and to sustain the life of these cities and secure the public health, they consequently would have to be supplied with channels of traffic and drainage,

thus transferring the fertility of the fields to the city, and finally to the sea.

But notwithstanding this great drain upon the fertile parts of the earth, which has been going on for centuries, has this fertility been wasted?

We are taught that nothing in nature is wasted, but is simply lost to the uses of man, or a generation of men. It may be recovered at another age of the world, or by another generation. An all-wise Providence foresaw this, for, in order to make good this loss, He has caused great deposits of crude materials to be placed in all parts of the world.

He has caused inland seas to dry up, and deposit, in that part of the world which we now call Germany, their contents of potash and common salt. He buried great forests in Russia and in the United States, from which to-day we are drawing oil and coal, and chemical salts which enter into plant food. He drove myriads of animals out of the sea on to the land in Spain, and in America, and, in this century, when we need them, we find them deposited as phosphate of lime, coprolites and soft guanoes. He made great pockets in Canada, into which he poured millions of tons of apatite, the mother source of phosphoric acid, and the predominant element of bone, and without which no skeleton of any living animal could be organized. He planted sulphur in Sicily, from which man by the aid of chemistry, manufactures sulphuric acid with which to dissolve this phosphate or apatite, and so make it quickly available for plants.

He placed in different parts of the United States and Canada, great deposits of copper pyrites, or "fool's gold," from which this sulphur can also be obtained.

He caused great deposits of organic matter to be placed under the equator in Chili, which by heat and moisture has been converted into the chemical salt which we are now mining as nitrate of soda, and from which we draw a large supply of nitrogen, the most costly part of all plant food.

And so I might go on enumerating the different natural deposits of crude materials which directly interest the farmer as a source of plant food, and a means of recuperating the soil which has been taxed by generations, and by injudicious culture. Perhaps these materials which an all-wise Creator has placed in different parts of the world are simply the lost products, or the waste of a cycle of civilization which existed upon this earth before Adam entered the Garden of Eden, and by the shifting process of nature, the upheaval of land and sea, the drying up of waters, has again been brought into use, and so rounding out a grand scheme of evolution and compensation.

Thus we see that these crude products, specimens of some of which I have before me, are placed for man's use ; and those which directly go to fertilize the soil are the ones with which I shall deal to-day.

The chemist has taught us that plants are composed of certain ingredients known as organic and inorganic or mineral ; that plants average to take from eighty to ninety per cent of their weight from the air, while the other ten or twenty per cent is taken from the soil, and that if man draws from the deposits which have been placed for his use, this small quantity of mineral matter, he can make his worn-out soil as rich and fertile as of old, and to blossom like the Garden of Eden.

New soil usually contains enough plant food for a number of crops. In some places crops have been raised for generation after generation without seeming to exhaust its fertility, and in other localities the virgin fertility has been exhausted in one or two crops.

Man has determined not only what these ingredients are which it is necessary for him to supply, but he has determined the various forms which are most suitable to plant growth. He has found that most soils yet contain all that is required of the ordinary plant ingredients, such as lime, silica or sand, iron, magnesia and many others, but that nearly all soils have been exhausted of their potash, their phosphoric acid or phosphate of lime, and their nitrogen. That if we supply these ingredients, every agricultural soil may be made fertile again.

Why these have been exhausted more than others, is because the crops which we grow contain more of these than they do of the minor ingredients.

According to the Stockbridge formulas, 100 bushels of potatoes take from the soil 21 pounds of nitrogen, 34 pounds of potash, and 11 pounds of soluble phosphoric acid ; 50 bushels of Indian corn take 64 pounds of nitrogen, 77 of actual potash, and 30 pounds of soluble phosphoric acid ; one ton of English hay requires 36 pounds of nitrogen, 31 pounds of potash and 12 pounds of soluble phosphoric acid, and so I might go through the list, showing that these are the leading constituents, while the others, although important, are taken from the soil in smaller quantity, and of which most soils have an abundant supply for years to come.

To furnish the necessary ingredients which I have mentioned, we in this country draw upon Germany for the potash, upon South Carolina and Canada for phosphoric acid, upon Sicily, Vermont and Spain for sulphur, and upon Chili for nitrogen, and also upon the waste products of all the manufacturing industries throughout the world.

Stable manure is one of the waste products of the agricultural industry; perhaps it is better termed a by-product. It contains all the fertility that has been taken out of the soil, less what man has absorbed for his support or the support of the animals which he keeps. If we plowed in all the crops we raise, it will be readily seen we should not exhaust the soil at all, but when we sell off potatoes, vegetables, grain and milk, we are taxing it in a greater or less degree, and are taking from it as many pounds of plant food in proportion as we take off pounds in agricultural products. To supply these drafts of man, nature has responded in a liberal manner, but now she says: "I can give you out of my great storehouse of fertility, an abundance of some of the minor ingredients, but if you wish to draw upon me further, you must make deposits in my storehouse of such ingredients as I do not possess, and in such forms as will be available for your uses. If you will do this, I will still continue to honor your drafts in the future as in the past."

How then to assist nature in carrying on her part of the work is the problem of the farmer to-day, and the manufacturer of fertilizers with his capital, his experience and his knowledge of chemistry comes to his assistance.

My friend, Professor Whitcher, of the New Hampshire Agricultural College, who is doing a noble work for the cause of agriculture, will tell you that the farmer has little or no use for the fertilizer manufacturer, as he can manufacture his fertilizers at home, and thereby save money, which I grant is a most important consideration. I agree with him up to a certain point. The manufacture of fertilizers, however, does not mean simply mixing these crude products together. That is only one stage of the process.

#### THE MANUFACTURE OF FERTILIZERS

begins back of this. It begins with the crude and by-products which require manipulation and treatment before they are even ready for home mixing.

Take bone for example. The manufacturer begins by gathering it from the slaughter-houses throughout the land; he extracts from it the grease which is of no value as a fertilizer, steams it in digesters under 60 pounds pressure, grinds it in mills requiring from 15 to 20 horse power, in order to make it fine, so that it may be evenly mixed in a fertilizer, or evenly distributed over a field. In short, he makes it available for plants. No farmer can do this unless he has these appliances. He may burn it at home and pound it up, but in that case he loses the most valuable part of the bone, namely, the ammonia, which goes into the air, and is lost to his uses.



Besides bone, almost every drop of blood and piece of waste meat is now saved throughout the land. This used to be fed to the hogs, and made pork that it is no wonder the Jews rejected. It is now gathered together by the manufacturer of fertilizers, and by means of steam and large dryers, is brought to a fine dry powder, freed of its moisture and grease, and containing twelve to eighteen per cent of nitrogen, a most valuable source, which used to be practically wasted.

The South Carolina phosphate and Canadian apatite which supplement bone, is mined from the depths of rivers, seventy, eighty and a hundred feet below the surface. Apatite is quarried in the deposits of Canada. The phosphate rock must be washed and dried, and the apatite must be freed from foreign material, and then both must be ground in mills adapted to the purpose.

The sulphur which is mingled with the copper and iron in the mines, must be eliminated in furnaces, and the gases gathered in large leaden chambers, and by a complicated process involving elaborate chemical apparatus, and requiring skill, is converted into a liquid which, next to water, is the greatest solvent in agricultural chemistry.

#### THE MANUFACTURER OF FERTILIZERS

is not content with this, but he sends out his vessels and steamers into the bays and sounds along the Atlantic coast, and gathers in great schools of menhaden fish, which are thought to feed to some extent upon the drainage which is poured out of the great cities, thus immediately recovering some of the lost fertility. These fish are steamed, placed in large presses, the oil extracted, and the pomace, looking very much like apple pomace, is dried, and becomes a valuable source of nitrogen and phosphoric acid.

The manufacturer roams the world over, gathering plant food wherever he can find it. If a cargo of damaged tea comes into New York, he buys it, because it contains plant food, thus transferring fertility from Asia to America.

The wine maker skims from his casks a deposit which is sold as argols. These argols are taken by the manufacturer of cream of tartar, and the bi-tartrate of potash extracted, which is again sold to the manufacturer of baking powders, but in this process there is left a waste product known as tartar pomace, which also contains plant food, and is purchased by the manufacturer of fertilizers; but this comes to him in a condition that requires drying and chemical manipulation before it can be used.

The sugar refiner has found that charcoal made from bone is the best material through which to strain his syrups and

clarify and make white his sugars ; but after a time it becomes loaded with impurities, and worthless for his use. It then finds its way to the fertilizer manufacturer, who knows it to be a valuable source of phosphoric acid, but it comes to him in large grains, often wet, and must be dried and ground and finally dissolved in sulphuric acid to be made available for plants.

The gas manufacturer puts in his retorts the soft coal which is converted into gas ; but there runs along with it a large deposit of liquor which the manufacturer gathers, and from which he manufactures a pure white salt, known as sulphate of ammonia, which is also another valuable source of nitrogen, and is also used for making aqua ammonia, alum and smelling salts.

The steel maker who is manipulating his iron ore under the new process, throws into his great retorts of molten iron quicklime, which immediately combines with the phosphorous in the iron, and forms a slag, which contains fifteen to twenty per cent of phosphoric acid, and is another product that comes to the manufacturer of fertilizers in large lumps and nodules, requiring to be ground and treated with sulphuric acid in order to be made available.

Even the shoemaker produces a waste known as "chippings," which finds its way into the hands of some manufacturers. Let the shoemaker be ever so careful in cutting up his leather, there will be small bits which cannot be utilized, although I am told they do now use them by means of glue, in making pieced heels, and also in the production of leather-board ; but these leather scrapings and cuttings, after the oil is extracted by the aid of steam and presses, are sold as a source of ammonia.

I am glad that your new fertilizer law in Vermont makes the use of this source of ammonia unlawful, and if it could only be detected in fertilizers by chemists, its use would be absolutely prevented. There is eight or ten per cent of ammonia in leather waste, but it is considered insoluble and unavailable for plants, and, therefore, an inferior source of plant food. Dr. Voelcker, chemist to the Royal Agricultural Society of England, says he would rather have one per cent of ammonia in the form of sulphate of ammonia than six per cent in the form of powdered leather. I do not think any reputable manufacturer selling fertilizers in the State of Vermont uses it to any extent ; but Professor Cooke, your Inspector, should be on his guard, and look for it with an eagle eye.

The wool manufacturer clips from his woolsens a waste which also contains nitrogen ; and the manufacturer of buttons and combs from horns and hoofs produces a waste which is another source of nitrogen, all of which are more or less valuable, and all of which require treatment to make them available.

Thus I might go on naming industry after industry producing by-products which directly concern the manufacturer of fertilizers. I can hardly name any staple industry that does not touch the fertilizer industry at some point. Hence, as you will see, the intelligent manufacture of fertilizers is not shoveling a little of this or that together, without rule or reason, and calling it a compound fit for the kings of plant life. It is a more comprehensive and complicated business than this would imply.

The good housewife makes bread at home, but how much thought and skill has gone into the preparation of the flour and yeast, and even the stove in which the bread is baked. The mixing of the prepared materials can be done at home, but if it is done on a large scale, at the rate of one hundred or two hundred tons a day, it requires large buildings suitably arranged with elevators, bins, mills and mixers with scales that will record the weight of a carload at a time, and others in the laboratory so delicate that they will turn at the weight of a hair.

This process can be stopped half-way, and the ground phosphate, dissolved bone, chemicals or dried blood can be shipped to the farmer, and he can mix them at home, but this is not the manufacture of fertilizers. It is but the last and easiest stage in a long series which require an extensive and expensive plant, and the employment of skill and large capital for its economical accomplishment.

No one would think of sweeping these things together which I have before me, and calling the result a mixed fertilizer, for the product would be no more a fertilizer than milk from a cow can be called butter, or cheese; or raw meat digestible food.

It is safe to say that the crude materials as they are received require to be handled at least six or seven times before the finished product is placed upon the cars for shipment, and you must remember that a ton of fertilizer or fertilizing material is just as heavy to handle in a fertilizer factory as on the farm.

Thus far in this paper, I have tried to show the essential ingredients of plant food, their sources, and the processes of manufacture. The practical question with every farmer here to-day is

#### HOW TO OBTAIN THIS PLANT FOOD IN THE CHEAPEST AND BEST FORMS.

In the first place, the farmer must remember that in buying chemicals he is taking as much risk as to the strength and quality of these as he is in the mixed fertilizer, for it is just as easy to adulterate the one as the other. You have in Vermont recently passed a most excellent law, which requires that man-

ufacturers shall not only "state what they sell," but shall "sell what they state." That is to say, they shall guarantee the per cent of ammonia, potash and phosphoric acid in the materials, as well as in the mixed goods, and if that law is worth anything and is enforced, as no doubt it will be under Professor Cooke, (as the old law has been for the past three years), the farmer is just as much protected in purchasing mixed materials as he is in those which are half prepared. So, when men say that if you buy the unmixed chemicals you will be more likely to get what you buy, they say that which is untrue.

No doubt you can figure out a saving between the prepared chemicals and the mixed fertilizer. Your wife can take the milk left over from day to day, set it, raise cream and make butter from it, and from the skim-milk a soft curd cheese, but it would not be such butter nor such cheese as you make here in Vermont. As a source of food it would have a value, but whether it would be as digestible and palatable as that obtained in the market, is quite another question. Whether you can mix the half-prepared chemicals so that they will be as evenly combined and as carefully distributed over your field, is a question for you to consider. You doubtless know that the amount of actual plant food which you apply to an acre is very small, indeed, as compared with the great bulk of soil. Professor Battles, of the North Carolina Experiment Station, says: "If the application of three hundred or four hundred pounds of fertilizer is thoroughly mixed with the soil, and an average sample obtained, by no chemical means can this amount be detected, and yet this application changes the yield from an unproductive to a productive one, and measures the line between success and failure." He further says, "NOT ONLY DOES THIS THREE HUNDRED POUNDS TO THE ACRE ESCAPE DETECTION BY CHEMICAL MEANS, BUT IT IS ALSO THE CASE WITH FIVE HUNDRED POUNDS, ONE THOUSAND POUNDS, AND EVEN WITH A TON APPLIED TO THE ACRE." Now if this is the case, how important it is that the fertilizer which we apply shall be in the best form, thoroughly mixed and carefully applied, so that it may be easily and quickly absorbed by the growing plant.

It must also be borne in mind that if the chemicals and prepared materials are bought unmixed, cash must be paid for them, and I wish the cash system of buying fertilizers could be adopted throughout the country. We were gathering together materials last June, July and August and all through the summer and fall which we are now manufacturing into fertilizers, and which will be shipped into Vermont and other States this spring. We shall not get our pay for this fertilizer until next fall, or from twelve to eighteen months after the first material

is put into the factory. This is all wrong, but it is the custom of the trade. Interest accrues, and interest is as much a part of the cost as the material, and must be added into the cost of the fertilizer. Then, too, there is an element of risk as well as a large shrinkage, which are items to be counted in. On the other hand, chemicals are sold free on board cars, and the purchaser pays the freight. In the case of mixed goods, the manufacturer delivers them to almost every station throughout the Eastern States, which averages to add three dollars more to the cost. He is also obliged to pay commissions to agents. If he attempted to supply the trade, shipping to each individual farmer, the business could not be done, because farmers, as a class, will not order until the last moment, and to ship out the whole year's product of a fertilizer factory in thirty to sixty days in spring would be impossible; hence, the manufacturer is obliged to ship ahead, and place in store-houses and in the hands of agents for distribution. Perhaps the time will come when all this will be changed, and the consumer and the producer brought directly together. As for one, I shall welcome any change which will bring the business nearer a cash basis.

It makes little difference to us whether we sell the mixed goods or the prepared chemicals. We are in the business for a living and a legitimate profit, the same as you are in the business of farming for a living and legitimate profit, and it is immaterial whether it comes to us on unmixed chemicals or on prepared fertilizers. The profit is not large in either case; some of you perhaps imagine it is ten, fifteen or twenty dollars a ton; but let me assure you that it will not average over \$2.00 a ton on the mixed fertilizers sold in the State of Vermont for the past year. I have made the statement, and am willing to repeat it now, that if any one will guarantee the concern with which I am connected, a net profit of \$2.00 per ton on the output of our factory for the next ten years, he may have any surplus which accrues above this amount.

#### THE PURCHASE OF FERTILIZERS.

In purchasing fertilizers, you want to consider that you are purchasing plant food. Don't let a ton of fertilizer mean simply a ton. Some tons of fertilizers contain two hundred pounds of plant food, and others five hundred pounds, but those tons that contain five hundred pounds can not be bought for the same price as those that contain only two hundred. We manufacture fertilizers running in all strengths; from one to eight per cent of ammonia, and from one to ten per cent of potash, and from five to twenty per cent of phosphoric acid,

and each has its respective value. When we buy fertilizer materials in the open market, we buy it on the content of plant food. You should buy mixed fertilizers or chemicals in the same way, and should consult your State Chemist, Professor Cooke, and the admirable tables which he publishes, to know what the different things contain, or the different brands of fertilizer analyze, and also the different forms in which the plant food exists.

It is with this as it is with milk ; some samples of milk carry ten and others fifteen per cent of solids ; the Massachusetts law requires thirteen per cent. Some samples of butter carry ten per cent of water, and others twenty per cent, and, other things being equal, that butter which contains only ten per cent of water is worth more as an article of food than that which carries twenty per cent, and why should not butter and cheese be sold upon their content of food constituents as any other article of commerce ?

Having considered the elements of plant food, their sources, and their content in fertilizers, let us for a moment consider the forms in which they exist.

Many have urged farmers to use phosphates in their raw state, particularly the crude South Carolina phosphate, contending that plants will absorb the phosphoric acid and make it available, and that by using it in this form they will get more for their money. I grant this is true to a certain extent. But is crude South Carolina phosphate as available as the dissolved ? The crops which you are growing in Vermont average to grow in sixty to ninety days. The seasons here are short. The plants must have their food every hour they are in the soil, and it must be available or they will not grow. If you think you can trust quick-growing crops on insoluble fertilizers, that is for you to determine, but in my judgment, taking the seasons as they go, wet and dry, hot and cold, you will find you will be the loser. You have to take a great risk as to the weather. That is the largest factor in raising crops. Can you afford to take any risk in the seed, the kind of fertilizer used, or the culture employed, factors over which you have control ?

Stable manure is the best source of plant food, all things considered. We can not manufacture anything equal to it. It supplies plant food gradually throughout the season, and seems to be adapted to the various kinds of plants. It should, however, be applied in its crude state, because you cannot afford to compost it. It is also particularly adapted to grassland, and should be used in more liberal quantity upon grass fields near at hand. A ton of stable manure, according to Dr. Goessmann, contains only about twenty-five pounds of actual plant food,

the other one thousand, nine hundred and seventy-five pounds being water, straw and organic matter. You can not afford to haul this one thousand, nine hundred and seventy-five pounds a long distance. Your rule should be to apply stable manure in larger quantities upon grass fields easy of access, and after that gives out, purchase, if you have faith, some form of plant food in the shape of chemicals or mixed fertilizer, adapted to hoed crops. It is generally conceded that better potatoes can be raised upon fertilizer than upon stable manure, and that the sulphate of potash is better for fruits than the muriate, and that nitrate of soda is a specific for grass. These are questions which relate to the form of plant food, and which has as much influence upon the quality and amount of the crop as the quantity applied.

This talk may appear to many of you to be in the interest of fertilizer manufacturers, but is it not also in your interest? Is it not for your interest to have all these crude materials gathered from all parts of the world, brought to your door, available for plants? Has not your own Professor Cooke shown in his last bulletin, just issued, that by competition and careful inspection, there has been a total gain of twenty-one per cent in favor of the purchaser in the last three years, or a saving in the State of Vermont alone, of \$21,000 on the single item of fertilizers?

Again, can you afford to starve your crops any more than you can afford to starve the cows in the barn? Before this meeting is over, there will be a great deal of discussion touching the feeding of dairy stock. Should you not also discuss how to feed the plant which feeds the cow, and is not the feeding of the plant at the basis of all other feeding? Given cheap plant food, would not the farms of Vermont flourish as of old?

I beg of you not to understand that I am talking to-day of the fertilizers of old. The fertilizer business has progressed with every other business, and I am considering plant food the same as you will discuss animal food.

Let me suggest that you go to Professor Cooke, or any other competent authority, and ask him how you shall feed your plants, and where you shall obtain the food with which to feed them, and finally, let me impress upon you to feed the plant rather than the soil.

We have heard a great deal about feeding the land, and it has crystallized into the maxim: "Feed the land, and the land will feed you."

At first thought, this strikes one as exceedingly sensible and practicable, but experience has shown that this is wrong, both in theory and practice. The soil—what is it? So far as plant

food is concerned, it is an enigma, but practically, it is a store-house of plant food, and a medium through which plants are fed. To be sure, it is more than a medium or receptacle, for it not only receives plant food, but helps to prepare it for assimilation. But the soil has no life in itself, hence no wants. You can not feed a dead body. It is the living, breathing plant which grows and thrives on the food fed to it by nature or by man.

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At the conclusion of Mr. Bowker's address, questions were asked :

*Mr. Macpherson*—Will you state the comparative value of bone black and bone meal per pound applied to the soil ?

*Mr. Bowker*—The value of bone meal depends upon its phosphoric acid and its ammonia.

*Mr. Macpherson*—That is ground bone, is it not ?

*Mr. Bowker*—Yes ; but it is the same. When the bone black has been burned in a retort and its ammonia thrown off, it is only valuable for phosphoric acid. The retail market price to-day for bone black is \$25 per ton, and for ground bone it is about \$35.

*Mr. Macpherson*—What is the relative value of bone undissolved, and bone black in its direct application to the soil ?

*Mr. Bowker*—I do not think there is any comparison. I should not apply the bone black to the soil undissolved.

*Mr. Macpherson*—Are there any experiments on record ?

*Prof. Cooke*—We made experiments on thirty-five different farms, and did not meet any success with it.

*Dr. Hoskins*—Mr. Bowker has done what I have long wanted manufacturers of fertilizers to do, and I think he has earned the thanks of farmers here by his statements in respect to the making of fertilizers, etc. I have used commercial fertilizers very freely on my farm for over twenty years, as I keep but little stock, and require a good deal of manure in my nursery, orchard, and market garden. I have bought a great deal of ashes, and also ground bone, as well as high grade fertilizers, such as Bradley's, Cumberland, and others, and I do not wish to be put before the public as antagonizing the fertilizer makers, though I have, as an agricultural editor and writer, criticised them somewhat freely at times. Mr. Bowker referred to this in his remarks, but not quite correctly. He once made a public statement, (or was so reported), to the effect that South Carolina Rock, however finely pulverized, would be of no more value when applied to crops than so much sand. I undertook to put this to the test of experiment in the field. It was a very dry season ; and the first part of it, up to the last of June, on the



piece (planted to corn and potatoes), where the phosphoric acid was applied in the form of flour—fine South Carolina Rock, known as “floats,”—was clearly behind a similar piece where the same rock, “dissolved” by sulphuric acid, was used. But after the rains came on, the crops on the undissolved “floats” caught up with the others; and at the end of the season there was no appreciable difference between the two. This, and subsequent experiments of a similar kind, satisfied me that “floats” can be used as successfully as ground bone to furnish phosphoric acid to growing crops. But here comes in a point which should be stated plainly, as I have endeavored to do many times, but which it is difficult to get farmers unacquainted with the chemistry of fertilizers to clearly understand. It is this:—That the South Carolina “phosphate” (floats) is not a complete fertilizer. Indeed, it is very far from being so, as it gives to the crops absolutely nothing but phosphoric acid. Bone gives phosphoric acid and nitrogen; wood ashes gives phosphoric acid and potash. With bone we have to add potash, and with ashes we have to add nitrogen, to make a complete fertilizer; but with floats we must add both potash and nitrogen. If this is not done, and the soil itself will not supply the deficiency, then it would indeed appear to the experimenter that “floats” “is of no more value than so much sand,” as Mr. Bowker has declared. But used properly, with a due supply of nitrogen and potash from other sources, I find that “floats” do as well for me, as a source of phosphoric acid, as ground bone, and at about half the cost. But I do not advise farmers who do not understand the chemistry of the subject to undertake the use of “floats.” They had better stick to the complete fertilizers of reliable makers. I myself, when I want quick results on a rather poor or worn soil, would use them; and to show that I have no antagonism towards Mr. Bowker, or his fertilizers, I will state that I have recently given his agent an order for nearly a carload of his Stockbridge brand, to be used upon such a piece of land that I have recently bought.

*Mr. Newton* of Dummerston—What do you say to the use of potash alone?

*Dr. Hoskins*—One element might be of use, if the other two were in the soil, but all the materials should be combined to get good results.

*Mr. Walker* of Woodstock—The use of stable manure places the land in a condition so that the plant can draw more from it. It makes the land porous, and makes the manurial matter in the soil more soluble. It is more affected by rain and sunshine, and it is affected by the elements more than it would be without it. So that it is a great remuneration for farmers to take

out their manure and put it on the soil, to make it loose, so that plants can get at it

*Prof. Cooke*—I wish Mr. Bowker would give us some light on the relative cost of the manufacturer dissolving the South Carolina Rock and the farmer doing it. That is, the cost of the sulphuric acid to do it.

*Mr. Bowker*—Sulphuric acid costs \$25 per ton in the form of oil of vitriol, and \$1.50 for each carboy which carries about 150 pounds. A ton would take practically about twelve carboys. It must be carried at the buyer's risk, and some railroad companies will not carry it. Adding freight charges would bring the price to the consumer about \$35 to \$40 per ton. Bone black will take about a thousand pounds of acid to a thousand pounds of black. It would cost about \$35 per ton, and we sell it at \$26 to \$30 per ton, ready mixed for use.

*Dr. Hoskins*—Sulphuric acid is a dangerous thing for persons to use who are unaccustomed to it. The smallest drop falling on the eye will destroy the sight, and it will burn holes in your clothes. I advise all inexperienced persons to avoid its use.

*Mr. Macpherson*—Would it not be well to use barnyard manure with the fertilizers, say, half of each in proportion?

*Mr. Bowker*—Fertilizers will supplement manure. Barnyard manure can only be used to advantage where you do not have to haul it a long distance. For potatoes, I should say it was not as good as fertilizer; the too free use of manure will cause a fungous growth. I use manure on the grass land near the barn, but don't haul it very far. I would like the gentlemen here present to understand that I am not here to advertise at all. There are half a dozen manufacturers in New England who make just as good an article as I do, and at equal prices. I present this article upon invitation of your Secretary.

*Mr. Peck* of Hinesburgh—How much plant food is there in a ton of your standard fertilizer?

*Mr. Bowker*—Our Hill and Drill Phosphate should contain from 300 to 350 pounds of plant food.

*Mr. Peck*—How is it with Stockbridge manure?

*Mr. Bowker*—From 400 to 450 pounds of plant food, about 25 per cent. The balance is organic matter, composed largely of carbon and hydrogen. This is the characteristic of most articles of animal and human food, also. Take milk, for instance,—13 per cent of solids; the great bulk is water. So the great bulk of fertilizers is organic matter.

Mr. James Cheesman agreed with Dr. Hoskins in the undesirability and the unprofitableness to the farmer in trying to make his own fertilizers, or to use undissolved phosphates. The experiment had been made in England, but without success.

*Mr. Wheeler* of South Burlington—Is not the quality of cow manure dependent upon the quality of the feed?

*Mr. Bowker*—Yes.

*Mr. Sessions* of the Massachusetts Board of Agriculture—The liquid manure is the best plant food. In the matter of commercial fertilizers, the State laws require packages to be labeled as to contents and amount of phosphoric acid, potash and nitrogen. You are thus able to know just what you are buying. I think the fertilizers should be used with reference to the requirements of the soil it is placed upon, so that you get what the soil most needs. We must analyze the soil by experiments on crops. If you have potash enough in your soil, you will not need that. You only require, in that case, the phosphoric acid and nitrogen. An intelligent observation in this respect will tell us what we want to buy.

*Mr. Bowker*—*Mr. Sessions'* theory is: "Feed the land, and the land will feed you." My theory is: "Feed the plant, and the plant will feed you." I contend you should feed the plant rather than the soil. The difficulty in analysis of the land is, it tells what elements are there, but not how much is left in the soil after the crop is taken. By learning what is taken out of the soil, you can replace it. Professor Stockbridge used to say: "Consider your soil as a machine into which you put so many pounds of plant food, and out of which you take so many pounds in crops, the same as a manufacturer puts into the loom so many pounds of cotton, and takes out so many yards of cloth."

*President Tinkham*—Six or eight years ago, experiments were made by the Agricultural College. Samples of potash, phosphoric acid and nitrogen were sent out, with directions as to use. About eighty experiments were tried, and in no instance did nitrogen prove to be of advantage in its use.

*Mr. Douglas*, of Whiting—It seems to me the important thing is to find out what your soil needs, and supply the deficiency in that element which is lacking.

*Dr. Hoskins*—Farmers who use stable manure will not need much potash, if any at all, in their fertilizers. We used fertilizers before this German potash was discovered. They then contained little or no potash, and yet they did good work.

*Mr. Bowker* then read several authorities in support of his position, that the plant should be fed, and not the soil.

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EVENING SESSION. 7:30 P. M.

At the evening session many of Burlington's most distinguished citizens occupied seats on the platform, and the City

Hall was well filled. The Howard Opera House Orchestra played some choice selections, after which Rev. S. F. Emerson offered prayer.

Lieutenant-Governor Woodbury then delivered an address of welcome to the Vermont Dairymen's Association, in behalf of the City of Burlington.

### REMARKS OF LIEUTENANT-GOVERNOR WOODBURY.

Mr. Woodbury, who was received with considerable applause, said :

I feel honored that I have been requested to appear before you for a brief time this evening, and it affords me pleasure to bid you welcome to the Queen City of Vermont. We are glad to have you come here to accept such hospitality as we can give to you, to receive from us such friendly greeting as our people are always glad to extend.

We are very glad to have gentlemen—representative men of the State—assemble here to transact business of importance. You come here as the representatives of 55,000 people in this State engaged in agricultural pursuits ; although you come here more particularly to advance the dairy interests and products of the State, you are still none the less the representatives of that large number of men upon which the prosperity of this State so much depends.

More than twice as many are engaged in that line as in mechanical or other pursuits. You are the most important factor in the industries of our State. More depends upon your prosperity than the prosperity of any other class of persons ; therefore we feel it to be very important that this meeting should be successful, for much depends upon the action of this Association, and upon the knowledge it disseminates.

In my opinion this Association has been a great benefit to the State of Vermont ; it is the pioneer in raising the dairying interests up to the proper level, and I have no doubt that many of you feel to-night that it is but the beginning of what you expect and desire to see. You must realize that it is an age of competition ; that you are engaged in a competitive strife with brainy and scientific men, and that you must be on the alert in order to keep up with the procession. Vermonters can be depended upon to lead the way, and this Association is now leading the advance in the way of greater prosperity, and is inviting, by its action, others, who are not members of it, to fall into line.

There are a great many discouraging things about farming in Vermont. One great reason why the farmer of to-day is not prospering as he ought, or the dairyman, at least, is owing to the competition which he encounters by the manufacture and sale of that vile product, oleomargarine; and when that is legislated out of existence, as it ought to be, in this State and this Union, [applause] then the farmers who toil upon these hills will be somewhat rewarded for their labor. I have no sympathy at all with the idea that the manufacture of oleomargarine is a blessing to the laboring man.

As the profits of farming increase, of course the value of the farming lands will increase. For the last ten or fifteen years, as you all know, to your sorrow, farm lands have depreciated rapidly. If the products of the farm could be increased so that a fair return might be realized for the labor performed, then the value of real estate would advance. In looking over the field and seeing the interest that is being taken in the products of agriculture, it is very evident we have seen the hardest times in Vermont, and have come to the point where, instead of our farming lands going lower, they must appreciate in value; and, in the course of the next ten years, a very material increase will be noticed. I believe there is no place to-day in the United States where there can be a better return for farm products than in Vermont if, (that may be a large IF), if you can get out of the market this vile product I have spoken of, and I believe it will be done. If this Association makes such progress in the next ten years as it has within the last five, I believe its work will enhance the value of our farms.

We had in 1880, 217,000 cows. Now it would seem easy to increase the value of each cow's product at least one dollar, making a gain of \$217,000 to the State—or even two dollars—thus securing a gain of \$434,000 to the State.

We manufactured in Vermont last year twenty-five and one-fourth millions pounds of butter, the largest amount per inhabitant of any State in the Union, and we are exceeded by only one State in cheese—that is California. Vermont manufactured seventy-six pounds of butter per inhabitant in 1887—a large amount—a product of great value, if the price that it ought to bring was received for it.

The manufacture of butter in the United States increased 15 per cent between 1860 and 1870, and 15 per cent between 1870 and 1880, and the manufacture of cheese, according to statistics, had grown 100 per cent in each of these decades.

There has been established within the last year in this city, a VERMONT BOARD OF TRADE. I presume you are all somewhat familiar with it. It was started for the dairying interests

of Vermont, and to establish a central point where buyer and seller could meet personally or by letter and telegram, that the product of a dairy might be sold and purchased without expense to the seller, and I think they must come to see this will be a beneficial thing, if properly supported. Last year was our first experience, and it was not so successful as we had hoped, and a commission of one-tenth of one per cent per pound was charged, but the commission has been abolished, so that butter and cheese and other products may be sold upon the board without expense to the seller. It seems to me if this is properly supported, that it will bring about a condition of things whereby the seller can market his products without paying any commission.

The matter of cold storage is receiving the attention of dairymen, not only in Burlington, but in every other place where there is a large amount of butter. It looks to me as if there could be no more profitable investment than cold storage for the farmers of Vermont. There is hardly a year but what butter advances from July and August to October, November and December fully 20 per cent and over. If cold storage buildings were erected at convenient places in Vermont, where there is plenty of ice, and convenient access to a circle of dairymen, it seems to me there could be no better investment. What is good for the individual is good for the whole association of dairymen, and good for the State. By bringing in an increase of half, or a quarter, of a million of dollars each year, you would soon see the result in increased value of property, and a decrease in taxation, and an increase in the happiness of our people. [Applause.]

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#### PRESIDENT TINKHAM'S RESPONSE.

*Sir:*

I could wish it had fallen to the lot of some gentleman of greater ability than myself to reply to your kind words of greeting, or that I could more fittingly reply in my own behalf, and for the Association, to the cordial welcome given us this evening by the beautiful city of which you are an inhabitant. Well may it be called the Queen City, resting like a queen on the borders of your beautiful lake, which, mirroring its beauties, doubles them, and crowned on its summit by the noble institution whose light is not shed over Vermont alone, but stretches away across the Continent, and across the seas, to the remotest lands of the earth. Your words of welcome are impressed the more

upon our minds by the presence here to-night of this array of gentlemen representing all your interests, business, scientific, educational and mechanical.

In expressing our gratitude, I will not go further than to say that although we represent but one phase of agricultural interests, yet what is a benefit to that one interest is a benefit to the whole agricultural interest; so intimately interwoven and entwined are all the interests of our land, that not a single nerve of one of the remotest of them can you touch without the whole body politic feeling it.

Once more, I thank you heartily in behalf of the association, for the cordial welcome you have given us, and for the inspiring presence of prominent gentlemen of your city who are here this evening. [Applause.]

I will now introduce to you Mr. John Gould of Aurora, Ohio, who will have something of interest to say to us on

## THE ADVANTAGES OF THE DAIRY CONFERENCE.

Mr. Gould said: I am glad to be with you this evening in Vermont, and I am almost a Vermonter myself.

You have great advantages in this State, if you only use them to their utmost. There is great room for improvement, and the means of progress should be brought to every farmer in the State. Help them to help themselves. These meetings once a year are well enough, but they only reach those who attend them, and the great mass who do not come, derive no benefit.\* There must be a dairy conference that gets right down to the farmer at home. You can only reach that class by taking your dairy school right to it, to the class of men on the back farms, who are still using the old methods of a century ago, as their grand-parents did. All the butter should be made by the same rule, and that the most modern and improved. An increase of five cents per pound would mean millions of dollars. It must be got up to a standard of excellence and kept there. Calling attention to this industry is worth to you all the dairy conferences will cost you; it will call the attention of the world to the fact that Vermont is waking up to the best knowledge she has, in getting what the market wants. The dairy conference

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\*NOTE.—It is hoped that the four thousand copies of this Report which have been distributed throughout the State may result in no little good; still, it is hardly to be compared with the benefits to be derived from attendance upon these meetings, and personal contact with these inspiring dairy workers.

will educate the producers to know what the consumer wants, and in promoting the prosperity of the individual producer, you are promoting the prosperity of the State.

How shall the dairy conference be maintained? Find out how much they will cost you next summer by experience, and go to your Legislature, show them how you are improving the main industry of the State, and get aid in that direction. Then, again, the locality where your conference is to be held should contribute to the expense of holding it.

Vermont is a dairy State; it has the advantage of being near the best markets for butter and cheese. I know I could go on to that side-hill farm in old Guildhall now, where my father lived, and make a thousand dollars quicker than a man could do it on the same amount of land out in Dakota. If you will only put your own shoulders to the wheel, you can soon MAKE VERMONT THE BANNER STATE IN DAIRYING. I mean that; there is no "taffy" about it. You have the machinery started, and you only need the dairy conference and school. That will bring the dairymen together and make a common interest, start up a friendly competition and strife. When you do that, you have got into a channel that will tide you on to final success.

It will call attention to the most improved apparatus, the use of which will teach you how to get more butter out of a given quantity of milk. Get your conferences started and experts will attend and show you their methods of butter making. It will run counter current to a great many private opinions, but the true test is who gets the best results, that will eventually prevail.

TO BE PROGRESSIVE, WE MUST BURY ALL PREJUDICE, AND GET RID OF THE IDEA THAT WE KNOW MORE THAN ANY ONE ELSE ABOUT DAIRYING.

I like my own opinion, but I am always ready to accept a new idea if you will only convince me it is better than mine; and I am open to conviction.

If you dispose of your milk, it should be on a butter value. The time has arrived when it should not be pooled on its gross weight, the good with the poor. Co-operative dairying will never be a success until we remedy that defect. The dairy conference will show us what the evils are and convince us we are not furnishing good milk, and are asking another man, who is doing so, to divide with us.

There should be one factory in the State for the education of cheese makers; there should be butter schools, also, and diplomas should be given to the students; the possession of such



a certificate will give a young man a job anywhere. If I could get a good butter maker from Vermont I would hire him quicker than I would a newly-imported Irishman.

In Wisconsin, Professor Henry of Madison gives instruction at the farm, and the dairymen are making great advancement in that State. In their creameries they pay for the milk according to its value in butter, not according to quantity, and the result is a great success. They use Short's "Oil Test," which I will explain to-morrow. It is so called from its inventor, Prof. L. G. Short, who gave it to the dairymen of this country without charge on the patent. There is a dairy school in Madison, and there is to be one or more in New York State. In Wisconsin the school runs for ninety days as a session.

In several countries of Europe, dairy schools have been doing a noteworthy work for years. There is nothing like the dairy conference, however, for reaching the masses, and great practical results are shown without great expense.

Their cost out West is from \$50 to \$100 for a two or three days' conference. What you want to do to improve your dairies, is to get rid of your poor, unprofitable cows. When you have found one, and replaced it with a better animal, you have made real progress. You can learn the value of each animal on a butter basis by Short's "Oil Test."

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Mr. Tinkham then called upon President Buckham.

Mr. Buckham said he had been thinking of a remark by Mr. Emerson in his prayer as to the dominion God had given to man over the lower animals. The extent to which man's improvement in the grade of sheep and cattle had been shown in Addison County, where a superior sheep had resulted from the efforts of sheep breeders. The photographs of cows on the walls of this room show an animal immensely superior to the cows seen at the present day in Italy, for instance.

Mr. Douglas says the average cow produces 130 pounds of butter annually. It is no chimera to say we will have a cow that will produce 400 pounds of butter per year. If the Vermont farmer makes up his mind to do it, he can do it. It should not be left to chance, nor by natural selection, but by science. The man of science sits in his laboratory and puts away all thought of making money, and devotes his time and research to the benefit of the farmer, the manufacturer and the industrial occupations of life. Give him the honor which is his due, honor him for his unselfish labors. It is to the man of science that the farmer must look for improved methods and apparatus

President Tinkham then called upon Hon. Henry Ballard.

Mr. Ballard, in a few complimentary remarks, returned his thanks for the honor. Speaking of the appropriations made by the last Legislature, he said that if the others were as well used as has been the appropriation to the Dairymen's Association, they would be well used; and he felt glad that his individual action in voting for the appropriation was so thoroughly justified as he was convinced it was after attending these meetings.

Some years ago, when in the Senate, a move was made to abolish the Board of Agriculture. He had opposed it, and was persuaded it was an institution of great benefit to that large class in our State—the farmers.

This allusion to the Board of Agriculture induced President Tinkham to call upon Mr. Davis, of Westminster, the "Veteran" of the Board.

Mr. Davis responded by telling two anecdotes in his inimitable manner, which brought down the house, and sent the members home in a happy mood.

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#### THURSDAY FORENOON, January 17.

The dairymen assembled at 9:30 A. M., and at once proceeded to the business of the session.

The Chairman introduced Mr. George Aitken, Manager of the Billings Farm at Woodstock, who read the following paper:

#### ROOT CULTURE.

*Ladies and Gentlemen of the Vermont Dairymen's Association:*

The subject of this paper has been suggested to me by the questions asked by brother farmers who have visited the Billings Farm, as to how we could grow such large crops of mangolds, and if it paid to raise them. Those questions I will endeavor to answer, as far as the limits of this paper will allow.

The great objection that is generally raised to root culture in this country, is the immense amount of manual labor supposed to be required in growing them, while in reality they can be grown with less hand labor than is usually given to our corn crop here in Vermont; and it seems to me the reason for this belief by farmers who have tried root growing and condemned it, lies in the fact of their having tried to grow them on a flat or level surface; and if such be the case, I do not wonder at their complaining of the amount of hand labor required, as it is almost impossible to grow a paying crop of mangolds by that

method. I have seen some of those farmers take a milking-stool to the field to sit on while they tried to find the beets amongst the superabundant crop of weeds.

#### THE RIDGE SYSTEM.

The method adopted by nearly all successful root-growers is what is known as the ridge system, and consists in simply throwing the land up into ridges about 27 inches apart, which is done by running the plow moderately deep, leaving 27 inches between each furrow. This should be carefully done, so as to have the ridges the same distance apart throughout their entire length.

The seed is then sown on top of the ridge, and before the plant appears, it is well to go over the piece with a light dressing of nitrate of soda, which stimulates the plant to a rapid growth, and gives it a good start ahead of the weeds.

As soon as the plant shows above the ground, the cultivator should be started, with the outside teeth set slanting, so as to leave the ridge wide at the base and narrow on top, and if the ridging has been well done, the cultivator may be set within an inch of the plant on each side, leaving the top of the ridge only two inches wide. When the plants are about two inches high, they are singled out to a distance of ten inches apart, and this is where we get the greatest benefit from the ridge system, for the reason that the plants being on top of this narrow ridge are easily singled out by one stroke of the hoe back and forth across the top of the ridge, the workman walking at right angles to the row. After a little practice this can be done entirely with the hoe, without stooping to pull any by hand. I have seen men so expert at this work that they could do it thoroughly and almost as fast as they could walk, or a good deal faster than they could hoe a row of corn. This is usually all the hand work needed until the crop is harvested, and this can be done, with proper facilities, at one-half the expense of a corn crop of the same weight. Now let us look, for a moment, at the value of an acre of mangolds, and the cost of production.

We raised last season on 2 18-100 acres, 75 tons, or 34,282 pounds per acre, which at \$1.84 per ton (the food value given them by Professor Cooke, in his tables on the composition of the different food crops), gives us \$63.13 as the food value of one acre of mangolds.

Now the question arises, What does it cost to grow an acre of roots? Some root growers claim to be able to grow and put them in cellar at a cost of three cents per bushel. But, from a careful experiment which I made six years ago, I found that a crop of 26 tons per acre cost four cents per bushel. This

experiment was made on land hired at \$5.00 per acre, labor at \$1.50 per day, and commercial fertilizers being the only manure used. The crop was charged with the full amount paid for it, giving no credit for any that may have been left in the soil, so that I consider four cents a fair estimate of the cost of one bushel of mangolds, which will make a crop of 34 tons, 282 pounds, or 1,138 bushels, cost \$45.52, leaving a profit of \$17.79 per acre for roots alone.

But we have another source of profit that is often overlooked in determining the value of a root crop, which is the leaves. Sir John B. Lawes, of England, found by carefully weighing the crop of both roots and leaves, in experiments covering a period of seven years, that a crop such as we grew last year, would give a crop of leaves weighing 10 tons, 896 pounds, and as their feeding value is given at \$2.07 per ton, we get \$22.55 to add to the profit on roots, making the whole crop of roots and tops worth \$85.68, and after deducting \$45.52, the cost of production, we have a net profit of \$40.16.

I usually feed the tops on the ground, by turning the cows into the field about an hour each day, until they are all eaten up, and with the exception of celery leaves, I consider them the best milk-producing food I ever fed.

Another objection sometimes raised against this crop is, that it exhausts the soil more than a corn crop. I have never found it so; in fact, never could see any difference in the two crops in that respect, unless the beet tops were used as manure, by being plowed under when green, when the crops of grain and grass would be almost double that of the corn-cropped land, showing that beet tops are nearly as valuable for manure as for feed.

Some of you may consider this crop too large to take as an example, but I have grown a crop of mangolds every year for fifteen years in this country, and have never had less than 24 tons per acre, nor more than 40, and I notice one farmer in California reports that after keeping a careful financial account of his crop, found that he had realized a clear profit of \$40 per acre for 11 acres of sugar beets, last season.

In comparing these results with a corn crop, we need not go into particulars, as I have no doubt you are all familiar with the profits to be derived from this crop; but if you will take a crop of 50 bushels per acre, which you will allow is above the average—being more than twice the amount given by the Department of Agriculture as the average for the State of Vermont, which is only 24 bushels—50 bushels per acre will give us, according to Professor Cooke's values, \$34, which, after deduct-

ing 30 cents per bushel, or \$15.00 per acre, as the cost of production, leaves for profit \$19.00 for corn, as against \$40.00 for mangolds.

In conclusion, I will quote from a test made by Professor Brown, of the Ontario Agricultural College, of roots against grain, the test covering a period of 180 days :

The root ration consisted of 81 pounds of roots, cut and mixed with 12 pounds of hay ; the grain ration was 12 pounds of hay and 21 pounds of a mixture of oats, peas and barley, seven pounds of each. The daily cost of the root ration was 19 1-2 cents per head, while the grain ration cost 31 cents.

The average yield per cow was 20.9 pounds, on roots, and 22 1-3 pounds on the grain ration, making the milk of the root-fed cow cost 9 1-2 cents per gallon, and that of the grain-fed cow cost 14 cents per gallon, charging the average price during the last 12 years. On roots, the animal weight was reduced 14 pounds, and on the grain 12 1-2 pounds during the period of testing, practically nothing in the scaling of cows.

NOW WHAT ARE THE PRACTICAL AND SCIENTIFIC DEDUCTIONS FROM THESE FACTS ?

First, that 81 pounds of roots with 12 pounds of hay gave almost as much milk as 21 pounds of grain and 12 pounds of hay ; second, that this was done without reducing the animal's weight, and third, at 30 per cent less cost, even though the root ration was 37 per cent less in nutritive value, and was pitted against an unusually large quantity of grain, enough to fatten two store cattle, and which represented with hay the scientific standard of 1 to 5 1-4 for the best results from a dairy cows while the nutritive ratio of the root ration was as 1 to 7.4.

The manure values resulting from the consumption of these rations were about 4 cents for roots, and 9 for grain, per cow, daily. So that, in balancing all the points in a test like this, the manure value should be considered.

From the two cows tested for 180 days—one on each of those rations, and all other conditions being alike—the following comparison was obtained :

Milk produced on roots,	- - - - -	3,762 lbs.	
Milk produced on grain,	- - - - -	4,020 "	
Value of milk on roots,	- - - - -		\$47 00
Value of milk on grain,	- - - - -		50 00
Cost of food on roots,	- - - - -		35 00
Cost of food on grain,	- - - - -		56 00
Value of manure on roots,	- - - - -		7 00
Value of manure on grain,	- - - - -		16 00
Leaving a net gain for the root-fed cow of	- - - - -		19 00
And for the grain-fed cow,	- - - - -		10 00

Leaving a balance in favor of roots of \$9.00, which goes to show that roots are profitable as a food for dairy cows, even if

some of our advanced agricultural writers fail to see any thing but water in them.

Now, while I do not advocate the feeding of roots to the exclusion of grain, I am convinced that it would be to the advantage of every dairy farmer in Vermont to grow some roots for winter feed, and more especially those who breed their own cows; as I have never been able to find any thing to take the place of roots in keeping breeding animals in good health in winter, whether they be cattle, horses, sheep or hogs.

I had intended to say something as to the relative value of roots and ensilage, and their effect on breeding animals, but finding it would take more time than is allowed for one subject, concluded to leave it until some future time.

In answer to questions as to the feeding of beet leaves to cows, Mr. Aitken replied that they were fed on the ground, either before or after milking. In harvesting the beets, the tops are left on the ground, and the cows are turned into the field for an hour each day.

The roots were fed raw—not cooked; there is no advantage in cooking them; they were grown in sandy loam soil.

Roots are a safer crop than corn, because not apt to be damaged by frost or drought.

A good crop can be raised on gravelly soil, if it is not too gravelly.

This crop, (specimens shown to audience, some of which weighed 22 pounds), was grown with five cords of stable manure and 200 pounds of phosphate.

The seed should be sown about the first of June.

The quality of milk from cows fed on roots is not so rich in butter fat as is the milk from cows fed on grain.

*Mr. Ferguson*—One of our professors says the quality of milk is not affected by the food.

*Mr. Aitken*—If that professor would feed garlic, he would find there was a great deal of difference.

*Prof. Cooke*—What I have said was that any thing you can feed to a cow will not change the relative proportion of the elements of the milk from that cow. I did not say it would not affect the quality, but that you could not change the relative proportions of the ingredients of the milk by changing the food. It does not apply to the principle of "development," which should always be kept in mind. You can start with the calf, and by proper feeding develop in her a tendency to produce richer milk, and that tendency can be carried to her offspring, and in the course of generations, you can make a butter

cow. But you can not, in a few days, by change of feeding, change a cheese cow into a butter cow, nor a skim-milk cow into a Jersey.

There is one exception to this rule that the food can not change the quality of the milk, when you change from a dry to a succulent food, it will effect a change. When a cow is turned to pasture in the spring, the green food stimulates the glands and all the secretions.

In relation to this matter of roots and beet culture, I have analyzed samples of Mr. Aitken's beets; we find them to be rather more watery than the average, but the dry matter was of better quality than the average. We also found them more digestible; the digestible parts were in a proportion of about six parts of heat producing to one part of muscle producing; in that they are very superior to grain, which is badly balanced, having one part of muscle producing to 9, 10 or 11 parts of heat producing. In regard to the relative feeding value of one acre of beets and one acre of corn, one acre raised this summer at the Experiment Station, produced seven tons of dried corn fodder. According to chemical analysis, it would take about five tons of beets to equal one ton of corn fodder; so that seven tons of corn fodder would have the same value as thirty-five tons of roots, practically what was raised per acre, as we have just heard.

That estimate is exclusive of the tops; of course the tops would make quite an additional item of value, in favor of roots.

In analyzing these beets, we found the Norbiton Giant—long red—Mangold Wurtzel the best. Lane's Improved Yellow Globe was the poorest quality. The Norbiton Giant, and the New Kniver Globe (yellow) differ but little in analysis.

*Mr. Newton*, of Dummerston,—What was the corn you spoke of?

*Prof. Cooke*—The Sanford Corn, planted three feet apart each way, thinned out to three stalks to the hill, and allowed to stand until the ears, one on each stalk, and some stalks two, had arrived at a full roasting stage. It was put before the cows, and they said it was good feed.

*A Member*—I have recently seen a statement about a cow that was largely improved in quality and richness of milk by the food. How do you account for that?

*Prof. Cooke*—Either they wanted to sell that cow, or had been feeding improperly before.

*Mr. Newton*, of Dummerston,—Is it a fact that owners of Holsteins near Boston have a difficulty in keeping up the standard of thirteen per cent solids required by the Massachusetts law, and do they have to be particularly careful about the feed they give their cows?

*Mr. Sessions*, of Massachusetts—Where that standard is not reached, and the Inspectors find samples of the milk not coming up to the requirements, it is turned back to the producer by the middleman, and by a change of feeding, it is said, the milk is brought up to the standard. They were probably feeding too succulent food, which reduces the standard of the milk.

Mr. Gould stated that, from his experience, he had found the corn crop much more valuable and profitable than roots.

Mr. Aitken said his statements were made upon the basis of crops in Vermont, not Western lands.

*Mr. Gould*—From an acre of ensilage, I have sold \$114.00 of milk. I fed three pounds of clover hay a day to each cow. After paying for my ensilage, it left me 26 1-2 cents per day and the manure.

Mr. J. K. Brown, Dairy Commissioner of New York, said: We are keeping on 20 acres, 17 cows, four horses, and hogs and chickens. All the fodder we use for that stock, we raise on our twenty acres. We keep Jersey cows, which average 300 pounds of butter each, and get about 30 cents per pound for the butter, about \$90.00 per cow. After deducting all expenses, there was a net profit of about \$56.00 per head. That is fifteen to twenty dollars more than the gross income of farmers in our neighborhood who carry their milk to the factories.

We are using ensilage, and this is our second year. We can make butter at a profit of 16 cents per pound. We keep an account with every animal, and we know when an animal is not paying, and get rid of her for another. We feed ensilage summer and winter. I don't know of any other means by which we could keep that amount of stock on that land, except with the silo. We feed them some grain. I think this winter we feed three pounds of clover hay at noon; 20 pounds morning and evening of ensilage, and three pounds of clover hay evenings. There is a little acidity to the ensilage, but it is not sour. If your ensilage is sour, it is the fault of your silo, or in putting it in.

We feed seven or eight pounds of grain with the silage twice a day. We cut our corn for ensilage; never put it in whole. We use the Southern corn; we find that the grain is evenly distributed in the ensilage; never had any trouble in that direction.

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#### MILK TESTS.

The subject of milk tests was then taken up, and experiments were made by Mr. John Gould, with the "Short Oil Test," and by Professor Cooke with the "Lactocrite."



Mr. Gould said: In making this test with the "Short" method, you do not need much in the way of apparatus. You want to have some of these little tubes, and one of these small oil stoves, and an arrangement like this, like a cruet-stand, to hold your tubes. You can get it made cheap at any tinman's. Turn some of the milk into this tube or bottle; boil it two hours, add your acetic, and the oil will come to the top. Professor Babcock, of Cornell, the best dairy chemist in the United States, says this is a very accurate test. Tests with it can be as accurately made as with the Gravo-metric Test. It is a cheap and inexpensive way of testing the commercial value of milk. These bottles cost two dollars a dozen. Your tinman can make this boiler, and the oil stove costs 75 cents. You can buy the whole thing complete, with instructions how to use it, for ten dollars.

Mr. Gould then made tests with some milk he had brought with him, illustrating the use of the "Short" method, to show the amount of butter in the milk examined. These samples of milk, which were taken from different patrons as they came to the creamery, showed a variation of from one-fourth of one per cent to over four per cent of fat.

Professor Cooke then followed with an illustration of an experiment with the Lactocrite, which he said was a too expensive apparatus for individual dairymen, and was intended for scientific analysis. It might be used in factories and creameries.

Mr. Macpherson then showed his own method of cooling and aerating milk, and Secretary Bass called attention to Hill's Aerator, but more especially to the fact that some method of airing, and expelling the animal odor, seemed desirable, and rightfully demanded the attention of progressive dairymen. The New York cheese makers claim that it increases the amount of cheese obtainable from the milk one or two per cent, and prevents a gassy curd.

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#### THURSDAY AFTERNOON SESSION.

#### SILOS.

The question box was taken up as the first order of business, and questions were propounded in regard to silos.

Mr. Sheldon, of Fairhaven, described how he had built a silo at small expense. He said: "For my silo I had the lumber got out in the woods, and hired a carpenter. I had not more than ten dollars to put into a silo. I built it in the bay of the

barn ; we simply banked it up with the waste that had accumulated from the hay and straw ; we let the load go on to the ground ; that was all the fixing we did for the bottom, and simply banked up the wall. My silo will hold about 100 tons ; we double-boarded it. I have two silos—one is double-boarded, with paper between ; the other is made one thickness of boards, then paper, and clap-boards. We did not cut the corn when it was put in, which makes harder work getting it out than if it was cut, and the cattle don't eat it clean, but what they don't eat we feed to the hogs, and they make a finish of it."

Mr. Samuel Bacon, of Middlebury, said when he first tried ensilage, he pronounced it a failure, from the effects he got from it, but a second trial had resulted better, and now he was a firm believer in its advantages. The first year it was packed away at once, and had a sour smell ; now his practice was to allow it to stand ten days before packing it away. He said : "I am keeping 30 cows, 80 sheep, and 7 horses, and I am selling hay."

Mr. Gould then told how he had made a cheap silo : "I built it inside of my barn, in the bay ; I set 2x4 scantling up against the frame, letting it go into the basement ; made the silo 22 feet deep ; then I commenced on the inside with cheap culled pine lumber—about \$13.00 a thousand—lined it right up in the inside with rough boards, not matched or planed. I took coal tar, and to each gallon melted four pints of resin, and painted the bottoms and sides. Then I lined it up and papered it with tarred paper, as you would paper a room, lapping the tarred paper about two or three inches. Then I commenced at the bottom, beginning with a six-inch board, so as to break the jointing, then followed that right up to the top and sealed it right up with rough pine lumber ; I sprung them down with a crowbar, and nailed them ; that made two thicknesses of pine lumber, with the tarred paper between ; then I painted it as before with boiling coal tar clear to the top, and where the coal tar was put on boiling hot, it went almost through these inch-pine boards, and made it as glossy and smooth as that paint on that wall. I took pains to square it and plumb it, so that the ensilage would not be apt to break it in settling ; the floor of the silo is the same clay that Adam wheeled in. We threw some of the dirt from the bottom against the sides, so as to make a depression, from the sides down towards the center. When it is filled, it falls into that depression and springs the dirt against the walls, and the more ensilage you have, the tighter it packs, and stops ingress or egress of air. Fifty-two dollars will be the cost for a 120-ton silo, every thing furnished.

My arrangement for the door was cheap and inexpensive ;

we loosened some boards, sawing them out, and made a door jamb and put the boards back into place. When the ensilage is in, it makes them perfectly air tight. As we want to get the ensilage, we take a board off, and shovel away the contents until we get down to another board, then we take that off. We do not put the boards back until we are ready to re-fill the silo again. The first silo I had filled, we weighted, but last year we did not put any cover on at all, scattered on a foot or so of straw, and left it, and a better cover I never saw. My neighbor is lazier, and he did not even put the straw on ; to our surprise, all the difference there was, was about two or three inches of mould on the top of the ensilage, and right below it was very good and not mouldy.

We have stopped using planking, and the tarred paper, and coal and sand for covering, and use now a foot of straw, with a few old boards ; the double walls can be dispensed with. No use putting in money to make it look better on the outside. It don't make it any warmer ; it's like a big posey on a woman's bonnet ; it looks prettier, but don't add to the warmth.

We mopped on the coal tar with a mop broom.

I wait and give the corn a chance to mature, before putting it into the silo. It costs 28 cents a load to cut it and put it into the silo.

At the conclusion of the discussion on silos, Mr. Gould was called upon, and delivered his address, on



JOHN GOULD, OF OHIO.

### THE KIND OF DAIRYING DEMANDED BY THE TIMES.

The rapidly-changing condition of things witnessed "here below" is no less actively at work in the dairy. So noticeable are these changes, that the methods and systems of dairying demand frequent re-adjustment, to conform with the times, for the dairyman who would succeed to-day, must put himself not only in full harmony with the times, but must become, as well, a student, and even a patient investigator of the principles that underlie, and to a great extent govern, and contribute to success.

At the start, let us see if we, in the last thirty years, have not drifted very far from the then supposed established customs. Take the year 1856, the initial year of my appearance as "help" in the dairy. The dairy itself was *native*, thoroughbred in unknown breeding. They were strangers to a barn, or stable. In the winter they slept in the woods, were foddered from the stack, milked in the open yard, and went dry full five months of the year. It is needless to say the first produce sold from the dairy in the spring, was cowhides.

Not that this kind of dairying was extremely profitable, but it did give the farmer some things to sell, and this paved the way to trade. It is needless to trace the growth of improved

dairying up to the present date. A moment's reflection is sufficient. Thoroughbred dairy cows, improved barns, milking stables, factories and creameries, and all kinds of improved apparatus, and last, but not least, the Dairymen's Convention, where progressive spirits meet to discuss, propose, and confer together, and give words of encouragement to that latest born of the dairyman's needs—the dairy school or conference, for practical, demonstrated work, placing new ideas, new and uniform methods, and newer schemes for not only labor saving, but enhanced value of product manufactured, before the masses in a way so clear, so intelligent, so practical, that even a general purpose dairyman, as he runs, may read, and not err therein.

I do not feel as I stand in the presence of the notable dairymen before me, that what I may say shall be considered in the line of teaching, but rather, one dairyman talking with another for the common good of all.

While I have had more or less to do with dairying for forty-five years, I feel I am yet a student in the prepatatory department, and I expect to get far more of value from you than you can possibly receive from me, even though Yankee I am from the ground up.

I said the rapidly changing condition of things was calling for new plans, customs and systems in the dairy. Now briefly, let us consider for a few moments what some of the things that the "Dairying demanded by the times" calls for. It first *demand*s a *dairyman* in the full sense of the word. It calls for a man who is alert, eager to excel, and never content with low, or even average results. It wants a man who is not only in sympathy with his vocation, but one who is attached to his business, and becomes an apt, inquiring, progressive student. By this I mean not only to investigate and watch progress, but a reader of our best dairy literature, and not set up his judgment, and too often prejudice, against government and State investigators and sound science, as practiced by our best dairymen.

#### SPECIAL ADAPTATION.

Dairying demanded by the times now calls for a definite object in view. The markets are now forming channels, so to speak, that demand special lines of goods, and the wise dairyman now selects one of these specialties, and bends all energies to meet the demands of that line of inquiry. So the dairyman who has no end in view, only using his dairy to keep him from the poorhouse, who has nothing to sell but grass when the market asks for fine butter, or still worse has *nothing* to sell six

months of the year when produce is high, will not succeed. He must have a dairy for a purpose—city milk, butter-making, or factory requirement. Select the one most promising. Build up from that idea, and strive to excel.

The dairyman must soon find out there is a difference in breeds of cows to best respond to this demand; so he must dairy with a *dairy cow*, not a combined animal, in which the characteristics of a steer are as conspicuous as the cow. I have little fear that any one here is yet clinging to beef production as a profitable auxiliary to dairying. No cow on demand can change the current of large and profitable milk-giving to that of successful beef-making, nor can any cow be so bred that any reliance can be placed upon her to transmit dairy qualities of desirable magnitude to her daughters, and mould and fashion beef performance in her sires.

The two demands are not in harmony. The practical experience of thousands of farmers all over the world is, that he who would best succeed must combine with his energy and purpose an animal especially bred and influenced for the work demanded.

Another argument is that a bar will always interpose between this combination; for until a pound of butter sells down to the level of a pound of beef fat on the hoof, just so long will it be unprofitable to put a ration into an unknown channel of direction that may make a pound of butter or a pound of beef, and run the chance of making very little of either.

The dairying of the times will demand that this beef element in our cows shall not be considered and placed upon an equality with dairy production; so long as we put them on an equality, so long will we have low production, and a market choked with tough 2-cent beef. What shall this cow be? I said, a type of cow adapted to the wants of our special market.

I have no one breed to recommend. There are cows for butter, there are cows for standard cheese, and there are cows that give milk for the city market—pump included. The reading, investigating dairyman, will make a study of the wants of his market, and make the supply accordingly. Briefly, *my* cow has a small, bony head; bright, prominent eye, that tells of brain power; a thin neck, a sharp backbone; ribs rafter fashion, instead of sprung on; broad hips; thin hams, and a high rump. For signs of a milker I want to see a muscular udder, not a fleshy one, and I want to see this udder of long attachment to the abdomen, to denote the power of absorption. I want strong arterial signs, because I now think that milk is closer allied to the blood than the books lay down. I want her to have a large place to lay away food, a good heart action to pump blood

through the system, nerve power to carry it on for years, and good lungs to purify the blood, and good pure air provided for the lungs.

It is demanded that the sire of this cow shall have a dairy heredity behind him, for I think the influence of breed is more potent to secure good cows than luck in obtaining "sports" to keep up high average performance of a dairy. Dairying being an artificial combination of the maternal function beyond nature's plan of calf-rearing, the cultivation of this milk-giving habit should begin with calfhood. The calf should be fed, cared for and treated as though it were already a cow; then when brought into the dairy, the first season's milk of that heifer should be prolonged as much as possible, to promote the milk-giving habit.

The times will demand that successful dairying must always be conducted in close observance of the laws that govern motherhood, and they are—kindness at all points; suitable milk-stimulating foods; protection from violent changes; continuous warmth and quiet, disturbing as little as possible the nervous organism that is the controlling power of maternity and milk-giving. I do not want a kicking cow, but I do like to see a cow with nerve and *sand* enough about her that if abused, will kick her abuser into the farthest corner of the barn, and kick so hard that when he arrives there he will comprehend that the cow had the best developed brain.

Dairying for the times demands that warm barns and comfortable quarters be provided for the cow.

Lumber and tarred paper are cheap, cow-ties are abundant, and if the stable is made warm and light the cow is made comfortable, and there is little need of exercise. While she is giving her three gallons of milk per day, she is having a strain upon her nerve power equal to the exertions of a trotting horse.

Exercise is not as essential to a dairy cow as freedom in the stable, light, warmth and pure air.

The times demand a treatment of the cow akin to gallantry, best expressed by sturdy old Chas. H. Beach, when he said: "Speak to a cow as you would to a lady." The dairyman has a call to be a gentleman in every way, and not give daily exhibitions of brutal boorishness to show authority.

#### WINTER DAIRYING.

Dairying demanded by the times recommends that we shall equalize production, and dairy when the market pays us best for it; in other words having "your dish right side up when it rains porridge."

The consumption of the markets is not greatly changed month by month, but we, as dairymen, go on and make two and one half times too much butter in the summer, and prices must rule low. How was it this winter? Why was butter high? Let it be what it may, those who had butter to sell profited by it. Will such a rise ever come in July? It is only ordinary business discernment that tells a man to dairy in the winter. Will it be overdone? Why ask, when you are one of the million who are overdoing it in the summer? Why not take an alarm in July of an over-supply instead of in January, when you are ninety days from having anything to sell at a profitable market?

The dairying of the times demands that milk shall be sold or proceeded with, not by what the milk weighs, but according to what it contains in *milk solids*. No one can make butter or cheese out of the water, or even the sugar in a cow's milk.

Every one admits that the milk of some cows is richer than of others; this applies to dairies as well. If the forty pounds of milk of one cow has a pound more butter in it than is found in the forty pounds of another cow, the owner of the first cow should have the pay for that extra pound of butter, and not be obliged to give half of it to the other farmer, for they must share alike in the profits. This applies to all milk for whatever purpose used. The butter quality of a cow's milk, up to the standard of about 12 1-2 per cent, determines its value for cheese-making.

To-day there is not an instance of a cow that gives a larger per cent of cheese in her milk than fats, but instances by the thousand are on record where the excess of solids above about 13 per cent are butter fats, and so we find a cow of large milk performance may be actually the poorest butter and cheese cow in the herd, and a cow of medium yield as good as the best; so we say the times demand daily testing of milk and cream in associate dairying of any character, and the painstaking investigation of our best investigators testify to it. Major Alvord went over the lists of the analysis of the milk of 1000 cows, but did not find in a single instance where the casine predominated over the butter fats, showing that the special cheese cow, beyond giving a large amount of balanced milk, does not exist.

The dairying of the times also demands that we should find out about this new alleged dairy doctrine that richness can not be fed into a cow's milk. If this is true that it can not, that increase of feed only makes the cow give more of the same quality, we must find out how far this extra feeding for value can be carried and not lose money. The records seem against



feeding quality into a cow's milk. Now if this is the case, we must seek it in breed, and our dairymen must in this line become investigators.

This seems to be true, that quality of milk is an inborn individuality of the cow, and is bred into her lines of ancestry, not fed into her by her owner; else some of the cows of great yields of milk would soon be giving eight and ten pounds of butter per day. I now recall the tested performance of a great cow, whose daily yield ran up into an almost fabulous quantity—some 94 pounds, but it was only more of the same kind of milk, and never went above—cheese 2.72, fats 3.16, or 5.88 of available solids.

The times demand that the dairyman finds out what each cow in *his* dairy is doing, not only weighing her milk daily, but putting it to the churn test to find out its per cent value of butter fat. The weight of milk is quite as unreliable as the indication of cream in test tubes. When put to an absolute test it will be found that profitable honors rarely go to the big cow, or the one of large yield; and one cow with another, it will be found that the medium-sized cow, with a medium-sized mess of standard milk, but good for three hundred days, is the one that makes the dairyman his profits. The tests of the dairy exhibits indicate this. The big cow pitted against the little one, the little cow behind an ounce or two of butter, the food of production the same, but the food of support as 3 to 5; but the honors go to the big cow, because she will some day have a big *hulk* of third-rate beef to sell that has cost, if our feeding tables are half way correct, about one dollar per pound. The dairyman's true test is, what will two cows do, weight of cows, amount of food consumed, and dairy produce made, not from the milk of the two combined, but each tested separately, cow against cow, pound for pound, produce against produce, for food consumed?

#### ECONOMICAL RATIONS.

The times also demand that the dairyman become a close and economical feeder of his herd to get the greatest amount of produce for food consumed, and that food shall be in cost reduced to its lowest limit. The truth is, that in the States, about four acres are required to summer a cow, besides her grain; and the wintering requires about two acres more of meadow, and yet more grain; in all, six acres of clear land, ten bushels of corn, one ton of bran, and some oil meal for the yearly support of a cow. Can not this be remedied? It can not be by following old plans, and the soiling crop in some form must come at some point, but what shall this crop be, and how secured? "He is going to bring in the silo now, isn't he?" I

am ! when I can demonstrate that on an acre of land I can raise feed enough, so that by buying \$15.00 worth of wheaten bran, I can keep two cows on one acre one year. I have a *right* to say that the times not only demand cheaper feed, but has furnished the means to supply it.

I do not go to the books or papers, or take hearsay reports, but to-day, on an ensilage ration that costs me less than 1 1-2 cents per day per cow, and 5 cents' worth of bran for each, my dairy sells me over 30 cents of milk for each cow. Nor is this a selected dairy, either, for on last Thanksgiving day they were delivered to me, a car-load lot, bought in Indiana. On this ration they give me about 11 quarts of market milk each per day.

The silo has solved this for me. I can make milk cheaper in the winter than in the summer, and what I am doing five thousand other dairy farmers in the States are doing also. The times demand not only a better cow, as you see, but a good barn, and then cheap food and an abundance of it. It does not pay to stand in one's own light in this matter. The world does not pay any one to decry progress, or conceited airing of prejudice.

The captain of the great Hudson river ferry boat cares little for row boat competition, that cries "the big new boat is a dangerous craft."

So our great dairymen, East and West, of whom I could name a hundred, go right along building silos, adding to their dairies, and making money, caring little for the fellow who feeds dear hay to a dry winter dairy.

The dairying demanded by the times asks for co-operation, not the co-operation that takes in a speculator for a partner, but a *dairyman's* co-operation in and of themselves. Nor should this banding together be other than to promote the dairy interest, also honesty, integrity, and foster progress at every point, each working for the interest of the other, discarding all jealousies and underhanded attempts to rob and defraud each other, but striving to be broad-minded, far-thinking dairymen. The arguments for co-operation are well known—the massing of the material of a locality, the uniform production of a superior quality, and meeting the market demands with what it asks for and in sizable amounts, such as will attract customers.

Hire the best of help and pay them living wages ; make it a matter of pride that you furnish the best, and be willing that once a day, week or month, what you furnish may be put to the test of its value. Stand above asking that your 3 per cent fat milk shall sell for the same as the milk of your neighbor, who has 4 1-2 or 5 per cent milk ; make that good milk from your dairy.

Live up to the rules, and don't be frightened if some one dubs your creamery "a little trust." Make the butter and cheese so good that the buyer can TRUST himself to buy it, sight unseen. Such co-operation is possible with men, broad between the eyes, and will pay; but if co-operation is a banded attempt to cheat each other, and in turn put low grade produce upon the market, ask for the appointment of guardians at once, and permanently retire from dairying.

The times demand that the dairyman shall make what the market calls for, and as the consumer wishes.

Do not dairy by your idea of a standard, but find what high grade produce is and how made, then make that kind. There is no special demand for soap-grease butter or skim cheese, nor does the market call for *buttermilk* butter, made from ACTIVELY sour cream, and salted with barrel salt. It does ask for the mildly acid cream, washed and moderately salted butter, put in the market fresh—the fresher the better.

Long-keeping butter is not in demand now, but is the kind that is traded out at the store. It never sells for money; it comes in competition with oleo. when it reaches the market. A lady told me once she would color her butter green if her consignors so ordered; if it brought five cents per pound more, that five cents was the consumer's paid pleasure, and her extra profit, with no investment in capital. Keep watch of not only the dairy papers, but the market report, and see if the lower grades of butter are ever boomed for a rise; compare the top quotations for a year, and average the steady 5-8-10 cent quotations at the bottom, and see if there is any profit in putting good material into poor produce. Become a business man. Venture away from the shore once, and when once away you will find no desire to return.

Dairying for the times demands working for reputation, not for yourself alone, but also for your locality. This means that a locality shall have largely a certain line of produce and strive for the best, and attract the consumer's notice, even if you have to advertise. Why should not in the year 1889 the dairymen advertise their business to attract attention? Why not advertise lines of fine butter and cheese, as well as stomach bitters and St. Jacob's Oil?

Not a cheese dealer but knows that Monroe county, Wis., is the great manufacturing center in this country for Limburger cheese. Why? Because they have made a specialty of it. Jefferson county, Wis., is noted for its fine butter. It sold in 1887 its butter at an average of 23 1-2 cents per pound, and Sank county in the same State, by each farmer making butter as he best saw fit, without reference to the butter demand of

the market, sold its butter for 9 1-2 cents. One had made reputation by intelligence; the other knew it all, and got its pay for its self-constituted knowledge by selling its butter at 14 cents less per pound.

The dairying demanded by the times asks for a general elevation of its output of butter and cheese, so far as quality is concerned. The markets of the world will at the present rate never be glutted with fine goods, but more likely to be submerged with inferior produce. Take one butter crop—a billion pounds and over. How much of it brought top prices? Not four million pounds. Why did two hundred million pounds go to increase the stock of the cheap grease men?

Why was our market flooded with poor cheese? Greed of the makers. This needs a remedy. It is the dairyman who is suffering from these things, and he must apply the remedy. We milk fifteen million cows in this country, and make four hundred million pounds of cheese, about what a million good cows should make. Fifteen million cows to make a billion pounds of butter! Less than seventy pounds per head. Can we, as dairymen, afford to keep fifteen million cows to do the work seven million should do? We eat one hundred million pounds of oleo. in this country. Do we do it to enable us to ship butter abroad? No, for we ship very little. Why? Because we can not make good butter enough to supply our own home demand, and it will not pay to ship the poor. So we make soap, etc., of two hundred million pounds, and eat one hundred million pounds of oleo.

England last year paid 26 1-2 cents for two hundred and seventy-seven million pounds of butter brought from Denmark and Holland to make good her wants, while we threw away almost enough, if made No. 1, to have supplied that want, and returned to us as dairymen the modest sum of over seventy million dollars.

In this I think the increased demand for dairy produce will come from the butter side, for while it seems there is a great call for butter at home and abroad, one that is increasing each year, the cheese supply is up to the wants of the market, and not greatly increasing; so to make what we do make better, as we add to our dairies, put the skim milk into veal and bacon-pork, and build up a market for fine veal and pork that is not all lard.

#### KNOWLEDGE IS POWER.

The dairying of the times demands its educational feature made prominent. Its dairymen must be made intelligent. I am not one of those who are inclined to think the farmer and

dairyman is robbed above all others. The energetic dairyman is never at a loss for freedom. Relief from poor cows, poor butter, high-priced feed, competition, etc., will not come from political enactment. No legislature can make a cow give more milk, make her ration cheaper, or make the acres produce more. This is the result of the active brain of the farmer. He who surmounts all these has no need of State help from syndicates, or a bounty on what he produces.

The greatest of all taxes a man pays, and the most galling yoke he wears, is his own ignorance and lack of business discernment. C. R. Beach, the noted dairyman, once said: "He never thought about his taxes, or monopoly of railroads, unless some one came along who *wanted office* and told him about it."

So, just as we lift the dairyman up, and make him intelligent and alive to his own interests, and make him an investigator just so soon will the oppression and monopoly that weighs men down disappear. To this end the best literature must be circulated; there must be more meetings of dairymen, not only in the State Association once a year, but the local one once a month, and the creamery men and patrons every week if they want to. Now the dairy school and conference is coming to the front, where ways, methods and systems can be made plain, where free tuition can be given, and its scholars, if proficient, can be graduated and given credentials. Whether these schools should be State or National, I do not care; but let us have them—a hundred of them if needs be; only make them effective and useful, and when we get started, let us have custom as strong as a statute law, that a man who runs a public creamery or factory shall be a graduate of this school. Make them so that one who is proficient and well up in the art can graduate with very little loss of time, but have his skill mark a certain level of proficiency. Europe is already dotted with these government schools. Even Finland, up under the Arctic circle, has six, and the result is, that by this educated excellence of produce Europe is occupying the prominent place that we should have been fitted to fill.

The times demand that we have full and explicit laws governing and controlling the manufacture and sale of bogus butter and dairy produce. And if regulation fails, be prepared to enforce prohibition of manufacture.

#### IT IS A FRAUD FROM THE GREASE POT UP.

A deceit, the selling of a material under the guise of respectability, purporting to be a thing that it is not. Ashamed to own its own colors, so poises as honest butter. Every scheme, art and device is used to disguise it, so the consumer shall not know or suspect that it is the fraud, but a genuine. Sold as

oleo., it disgusts and repels the consumer; and when sold as butter it is robbery, for it foists an 8-cent article on to the consumer at 30 cents, a 350 per cent profit.

It is not class legislation to put it under bonds to keep the peace—and its place. It protects both the producer of honest butter and the consumer who would buy it, from imposition; and such has had its constitutionality tested over and over again. The whole business has already been given too much rope, and it is full time this rope should be shortened. Selling it under a “sign” is only to legalize the fraud of substitution of the genuine for the counterfeit. We must, if possible, get a National law on this matter, so to make it operative in all States. I would not only have State laws, and State Commissioners of Dairy and Food to see that all laws are enforced, but we should have a regulation that the man who sells butter shall not sell oleo., and also compel the man who sells oleo. to sell that and no other kind, and thus refuse him the opportunity to deceive the buyer. Then it can be made to parade under its own colors, and it would be as ghastly a parade as “death on the pale horse.”

Then if the dairyman will milk a better cow, feed her better, and feed the color into her butter, it would dispense with any farther “pot calling the kettle black” along the color line.

The times demand this for the dairyman. Not to make a market for poor butter, for that carries the stamp of its true inwardness with it, but its penalty is a 10-cent price, while his neighbor, who puts alongside of a good well-fed cow pride of *manufacture* and an exhibition of skill and understanding into his butter, sells at 30 to 50 cents per pound.

The times are each day demanding better butter, and until the farmers supply that demand the *fates* strike deep at the roots of the profits of the poor makers, and those elfins of the air, “The Brownies,” through the maker’s neglect, sour the milk, make bitter the cream, destroy the flavor of the butter; they work it into a salve, they eat out its color, and even force this man to exchange this butter at the grocery for codfish, pound for pound. Yet this butter is the peer of the practices of the oleo. men. The one man refused understanding, and the market furnished him with low prices, for this butter deceives no man. The other is born of darkness and uncleanness, made to wear the garb of respectability, but inwardly it is a compound of decomposition and should be made by law an outcast, else in time its greed will swallow the earth. Finally the demands of the times have so far resulted in this noticeable progress. It has given the dairymen of 1889 a better farming, because its one great specialty shall make a special money crop,

and hence the other revenues of the farm are not consumed wholly in making a "live of it." It gives the dairyman an insight into a principle he must familiarize himself with, and that is, that there is an underlying principle that governs, rather than *luck*; the last can never be other than a hit and miss occupation, in which the tally scores far more on the miss side. It has demonstrated to him that the farm can be made to produce very largely the cheap and abundant rations needed for his dairy, and because cheap, abundant and home grown, there must be a profit in dairying if intelligence is exhibited in management. It has made it possible for the farmer to become a manufacturer, and put the gross growth of his farm into a finished product ready for consumption, and have the residue of manufacture to enhance the fertility of the farm. It makes freight rates of small moment to him, as the freight car that carries but a few hundred dollars of grain, carries thousands of dollars' worth of butter and cheese.

To-day co-operation has been carried to such a point of perfection that I doubt, unless great difficulties present themselves, if a valid argument can exist for the continuation of home manufacture of butter and cheese; therefore, I place co-operation among the demands of the times. The present year shows in full vigor of active development the Dairy Association, Dairy Fairs and Dairy Conference, and a promise of the coming Dairy School; these must have a marked influence upon us as dairy-men, if we see that the times demand of us every assistance in our power to make each in its place successful. We begin to see and feel that the dairy has commenced to attract not only some of the best minds of our country, but also the notice of the government, and its fostering hand will protect us.

The times demand that the dairyman step out into the bright, clear light of intelligence, and prove himself worthy of this attention, and gain beside the mead of victory, for victory must always perch on the standard of those who do and dare for progress, honesty, purity and justice; the times will demand for these a final and lasting triumph.

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After Mr. Gould had finished reading his paper, President Tinkham introduced Mr. E. A. Harris, the Boston butter connoisseur, to state the result of his examination of the butter and cheese exhibits. Mr. Harris said:

The first criticism I have to make is on the number of exhibits. Only sixty of butter from this great dairy State; and cheese—only nine samples of cheese to take \$50 in premiums.

As to the butter, it is of very good quality for butter made at this season of the year, as good as was ever put on exhibition in the United States. Of course it makes a difference in the quality whether the cow is a new milch cow, or whether she has been milked nine months; and it makes a difference, too, as to whether this week's or last week's butter is presented. But I judged this butter just as if I were in my stall in Quincy Market, selecting for my customers.

The cloudiness of the morning somewhat interfered with judging the color, and when the sun appeared it made quite a different shade on many samples. It would be impossible for any person to find any two samples of exactly the same shade. I do not profess to be a color expert, but I can tell the color that suits our trade. In no single case was I acquainted with the name of the maker or where it came from, so there has been no possibility of favoritism. I had no means of telling whose butter it was.

In putting up butter it is very necessary that your tub or box should be thoroughly cleansed from the wood taste. The only way is to steam the tubs, or scald them and soak them in a strong brine, with plenty of salt; you can not get it too salt.

When you put your butter into boxes or tubs don't put on a dry cloth or one soaked in fresh water, but soaked in strong brine, and use new cloth, no second-hand goods. I am often asked what sized packages are the best. When you have one creamery that sends in five-pound packages, don't all the rest of you send the same size; have a variety. We want packages of 50, 30, 25, 15 and 5 pound boxes of butter. People in Boston want the best piece of butter for 25 cents.

It is a nice thing to have a creamery, but it is a bad thing for you men who make *fine* butter to go into a creamery. Good dairy butter keeps better and gives better satisfaction than creamery butter.

*A Member*—Are there not a dozen samples that come to Boston that rank in price above the average, or highest creamery price?

*Mr. Harris*—Yes—twenty. The highest priced butter is the Darlington.

*President Tinkham*—The Darlington butter is made uniformly, and the cows are constantly replenished. As soon as one fails to come up to the standard they get rid of her, turn her into beef, and replace her with a young milch cow.

*Mr. Harris*—The Darlington butter is a thing for millionaires' tables—men who can and will pay a large price for a fancy butter. There is about 300 pounds of it sold in Boston weekly. I like the Darlington better than any butter I ever tasted. It fetches \$1.00 a pound in the market.



*President Tinkham*—The Darlington's have a small pasture where the cows run out all the while. They feed them clover hay—eight pounds twice a day, wet bran and corn meal. Their butter is sent to market in pound balls.

*Mr. Cheever*—The samples of butter are nearly all marked 10 on salt.

*Mr. Harris*—Nearly every sample of butter was awarded ten points on salt. Some are light and some medium, but if the salt is not objectionable or coarse and gritty, I have marked them ten. You want to meet the tastes of your purchasers.

*Mr. Kinerson*, of Peacham—Every member of this Association should bring samples of his manufacture; he would get his points marked, and see wherein he was deficient. There were men in Caledonia county who thought their butter was everything it ought to be, but they found it was marked where it ought to be, and they went home wiser men; and as a result they are to-day turning out much better butter.

*Mr. Douglas*, of Whiting—I think it is the duty of members to send in exhibits. I always make a rule to do so myself, and we all ought to do it.

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## BUSINESS MEETING.

Immediately upon the close of the afternoon exercises was held the regular business meeting of the Association. A question arose as to who was eligible to vote for officers of the Association. President Tinkham stated that life members could vote at all the meetings held during their natural lives. Annual members voted at the annual election for the year they paid such annual dues.

The committee, consisting of Messrs. H. M. Arms, of Springfield, Aaron Loveland, of Norwich, and Henry Walker, of Woodstock, who had previously been appointed to take into consideration the original constitution, the amendments that had been adopted since, and to formulate such recommendations of further amendment as they found desirable, submitted their report. The several amendments were considered separately, and each adopted by a vote nearly or quite unanimous. The constitution as presented on page four of this Report is as now amended.

The election of officers then followed, resulting as appears on page two of this Report.

Hon. F. D. Douglas was then conducted to the chair, and returned his thanks to the Association for the honor conferred upon him.

Retiring President Tinkham thanked the Association for the courtesy it had shown him at all times, and the support its members had given him in the positions he had held, both as Secretary and President. He pledged his faithful allegiance and hearty support of the work of the Association in the future, and on motion of Mr. M. W. Davis the Association tendered him a unanimous vote of thanks.

*Mr. Ferguson*—In order to bring the matter of DAIRY SCHOOLS and DAIRY CONFERENCES before the Association, I move that a committee of the five gentlemen (whose names are here given), consider the matter, and report thereon to-morrow. Voted. On the morrow the committee appointed by the Association to consider the subject of Dairy Schools and Dairy Conferences, respectfully reported as follows :

It seems best that the founding of a permanent Dairy School be for the present postponed, until the success of the Dairy Conferences shall warrant making the advanced step.

We recommend that the Executive Committee of the Association make arrangements, if possible, for holding two (2) Dairy Conferences the coming season, and that they invite to co-operate in this work the Associations and Granges of the State that have for their common object the advancement of our farming interests.

And we would further suggest that the State Agricultural Society be requested, either by themselves or with the co-operation of this Association, to hold a Dairy Conference in connection with their next State Fair.

And the Committee respectfully appeal to the dairymen, factorymen, and creamerymen of the State to give their assistance in furthering this most important advance for the dairy interests of our State.

*By the Committee,*

JOHN GOULD,  
HENRY W. WALKER,  
A. D. EVARTS,  
M. O. STODDARD,  
W. W. COOKE.

BURLINGTON, VT., Jan. 18, 1889.

The Association voted to accept and adopt this report.

The Committee on Resolutions, through its chairman, Mr. H. W. Vail, reported the following resolutions, which were accepted and adopted :

*Resolved*, That the thanks of this Association are hereby extended to the Legislature of the State of Vermont for the liberal appropriation in fostering this, the leading industry of this State, enabling it to greatly extend its usefulness, as witnessed by the grand success of this meeting.

*Resolved*, That the thanks of this Association are due and are hereby tendered to the citizens of the Queen City for their interest manifested in this Association by their presence, and the cordial words of welcome of their distinguished citizen, our Lieutenant-Governor, U. A. Woodbury.

*Resolved*, That the thanks of this Association are hereby given to those able gentlemen from other States, whose deep interest and words of wisdom we feel assured will inure to the lasting benefit of the State.

*Resolved*, That the thanks of this Association are due to our retiring President, O. M. Tinkham, for the impartial and courteous manner of presiding over our deliberations.

*Resolved*, That we thank the railroads of the State for their kindness in extending to this Association the advantages of reduced rates.

A protest signed by H. M. Arms, Aaron Loveland and George Aitken, against the award and payment of a premium under Class 5 to Messrs. Newton & Hazen, of Hartford, 1st, because no such creamery was located at Hartford, and, 2d, because the butter was made in a creamery out of the State.

Mr. Dana, representing the creamery that sent in the butter, said the creamery was on the line between Vermont and New Hampshire, at Lebanon. A motion was made that the protest be sustained, and the motion was carried. A similar protest was entered and sustained against the award of a premium in Class 4 to W. V. Beach, and the following resolution was offered and adopted :

*Resolved*, In order that no imposition may be practiced upon this Association or the judge of butter, and no person wronged, we recommend to this Association that in future all creamery butter entered for premium be accompanied with a copy of the certificate of said creamery from the Secretary of State.

Secretary Bass read the following resolutions, as adopted by the New York Dairymen's Association, in regard to the passage of a law by Congress to regulate the sale of skim cheese :

WHEREAS, One of the greatest hindrances to an increase in the consumption of cheese in this country, and hence, danger to prosperous cheese production, lies in the manufacture and sale of skim cheese, and,

WHEREAS, A large percentage of consumers purchase such cheese, with no previous knowledge of the nature of their purchase, thereby suffering imposition, therefore,

*Resolved*, That it is the sense of the Vermont Dairymen's Association, that Congress enact a law with the proper penalties for the infraction thereof, requiring all cheese made from milk from which any portion of the cream has been taken to be branded "Skim Cheese," and to be sold as such.

*Resolved*, That all dairy associations and kindred organizations throughout the United States be invited to co-operate with this association in the endeavor to effect such legislation as aforesaid.

President Tinkham and Vice President Stone having spoken in favor of adopting the resolutions, on motion they were unanimously adopted.

A notice of the organization of the National Dairy Fair Association was read and its object complimented.

## TWO HUNDRED DOLLARS WERE PAID IN PREMIUMS ON BUTTER AND CHEESE AS FOLLOWS:

### DAIRY BUTTER.

#### Class 1.

Best ten pound tub butter,	HENRY W. WALKER, South Woodstock,	-	-	-	\$10 00
2d " " " "	E. R. TOWNE, Waterbury,	-	-	-	6 00
3d " " " "	F. L. DAVIS, North Pomfret,	-	-	-	4 00

#### Class 2.

Best five pound box,	F. E. LAMBERTON, North Pomfret,	-	-	-	\$10 00
2d " " " "	STEPHEN HEWITT, North Pomfret,	-	-	-	6 00
3d " " " "	L. W. PITKIN, Marshfield,	-	-	-	4 00

#### Class 3.

Best five pounds print,	GEO. AITKEN, Woodstock,	-	-	-	\$10 00
2d " " " "	F. D. DOUGLASS, Whiting,	-	-	-	6 00
3d " " " "	C. S. PAINE, South Randolph,	-	-	-	4 00
Dairy sweepstakes,	GEO. AITKEN, manager of Billings Farm, Woodstock,	-	-	-	10 00

### CREAMERY BUTTER.

#### Class 4.

Best twenty pound tub butter,	A. D. EVARTS, Vergennes,	-	-	-	\$10 00
2d " " " "	SPRINGFIELD CREAMERY, Springfield,	-	-	-	6 00
3d " " " "	FERGUSON BROTHERS, Burlington,	-	-	-	4 00

#### Class 5.

Best five pounds print,	A. A. STORRS, South Randolph,	-	-	-	\$10 00
2d " " " "	J. S. REYNOLDS, Essex,	-	-	-	4 00
3d " " " "	No entry.	-	-	-	
Creamery sweepstakes,	A. D. EVARTS, Vergennes,	-	-	-	5 00
Grand sweepstakes,	GEO. AITKEN,	-	-	-	10 00

No person nor the product of any lot of cows was allowed to compete in more than one of the above classes.

#### Class 6.

\$25 was divided among 19 samples scoring above 85 points not included in the foregoing list, as follows:

S. H. Warren, North Pomfret; J. Gregory Smith, St. Albans; J. S. Sherburn, North Pomfret; W. S. Hale, Keene, N. H.; G. S. Short, East Montpelier; Aaron Loveland, Norwich; Ezra Stevens, Jonesville; exhibit from Poultney; James K. Curtis, Georgia; James Shanley, Pleasant Valley; S. L. Hastings, Passumpsic; J. R. Kinerson & Sons, Peacham; R. J. Kimball, West Randolph; J. B. Wells, West Randolph; D. A. Clark; J. O. Sanford, Stamford; J. H. Bickford, West Lebanon, N. H.; Glens Falls Creamery, Glens Falls, N. Y.; P. Stedman, Chicopee, Mass.

Class 6 and the Grand Sweepstakes were open to competition from all parts of the United States and Canada. Classes 1 to 5 inclusive were open to Vermont butter only.

To secure uniformity of conditions as far as possible, it was recommended that all butter for competition be made on the Saturday or Monday preceding the meeting.

#### CHEESE.

Best dairy, plain,	J. H. RILEY, Sheldon,	-	-	-	-	-	\$6 00
2d	"	MRS. C. H. CLARK, Underhill,	-	-	-	-	4 00
3d	"	N. D. WHITE, Huntington,	-	-	-	-	2 00
Best dairy, sage,	MRS. C. H. CLARK, Underhill,	-	-	-	-	-	6 00
2d	J. C. OLIVER, Charleston,	-	-	-	-	-	3 00
Best factory, plain,	Essex CHEESE FACTORY, Essex,	-	-	-	-	-	6 00
2d	"	H. JOHNSON'S FACTORY, Williston,	-	-	-	-	4 00
3d	"	C. H. PECK, Hinesburgh,	-	-	-	-	2 00
Best factory, sage,	Essex CHEESE FACTORY, Essex,	-	-	-	-	-	6 00
2d	"	No entry.	-	-	-	-	
Sweepstakes,	Essex CHEESE FACTORY, Essex,	-	-	-	-	-	10 00

#### METHODS EMPLOYED BY WINNERS OF BUTTER PRIZES.

Class 1, best ten pound tub.—Henry W. Walker, South Woodstock, 1st prize, High grade Jerseys, fed morning and noon 10 pounds of timothy and clover hay at each foddering, and 10 pounds cut corn fodder at night. Grain, feed a mixture of 4 1-2 parts corn cob meal, 2 parts bran, 1-2 part linseed meal, 4 quarts of mixture fed morning and night. Cooley Creamer used; set milk 24 hours at 42°. Cream ripened until acid; churned in a Stoddard barrel churn about 45 minutes; washed in the granular form, and salted with 1-2 ounce to the pound of Higgins' salt; worked once with a lever worker; marketed in boxes.

E. R. Towne, Waterbury, 2d prize. Forty Jerseys and grades; feed herds-grass and clover hay, 5 quarts corn meal and bran, half and half by weight; set the milk in large pans 36 hours; ripen the cream until sour; churn with a Samson's churn; wash in the granular form; salt with 1 ounce of Higgins' salt to the pound; work once in the old-fashioned break; market in tubs and trunks.

F. L. Davis, North Pomfret, 3d prize. Seventeen thoroughbred Jerseys; feed early cut timothy with a slight mixture of clover, 18 1-2 pounds per cow per day, 10 pounds cut corn fodder, 6 pounds corn meal, 2 1-2 pounds bran, 7-8 pound cotton-seed meal; set milk in small pans 30 to 36 hours; ripen cream until slightly sour; churn in a Stoddard barrel churn about 45 minutes; wash in granular form; salt 1-2 ounce to the pound, Higgins' Eureka; work once with a lever worker; market in tubs of different sizes.

Class 2, best five pound box.—F. E. Laimberton, North Pomfret, 1st prize. Eleven Jerseys; feed hay with a mixture of corn meal, bran and cotton-seed meal; set in small pans and skim before the cream sours; let the cream stand 36 hours before churning, which is done in a barrel churn 45 minutes; work with a lever worker; salt 3-4 ounce to the pound, Higgins' salt; wash in granular form.

Stephen Hewitt, North Pomfret, 2d prize. Eighteen grade Jerseys; feed with a mixture of 4 quarts of corn meal and 2 quarts wheat bran per day; hay set milk in deep cans in running water 24 hours; have the cream slightly sour; use a Stoddard churn 30 minutes; wash in the granular form, and salt with Higgins' salt, 3-4 ounce to the pound; work once with a lever; market in 5-pound boxes.

L. W. Pitkin, Marshfield, 3d prize. Twenty-five Jerseys; feed hay, 20 pounds, in two fodderings, 1 bushel of ensilage in two fodderings, 6 pounds of meal composed of 3 parts corn, 1 part cotton-seed and 1 part bran; set by Cooley process 12 hours; churn in a barrel churn 1 hour; wash in granular form; salt 3-4 ounce to the pound; work once.

Class 3, best five pounds print.—Geo. Aitken, Billings Farm, Woodstock, 1st prize, dairy sweepstakes and grand sweepstakes. Twenty thoroughbred Jerseys; feed 2 pounds oats and peas ground, 2 pounds bran, 3 pounds corn and cob meal, and about 6 pounds each of corn stalks, barley straw and good hay, with 1-2 bushel of mangolds; set in Cooley Creamer 24 hours; let the cream get slightly acid; churn with a Stoddard churn 1 hour; wash in granular form; salt 1-2 ounce to the pound, Higgins'; work once with a Reed worker; market in prints and boxes.

F. D. Douglas, Whiting, 2d prize. Jerseys; feed early cut clover and timothy hay, cotton-seed, corn meal and bran; set milk by the original Douglas method 36 hours; let the cream get slightly acid; churn in a barrel churn 30 minutes; work in granular form; salt in the churn dry; work once; market in tubs.

C. S. Paine, South Randolph, 3d prize. Eight grade Jerseys and grade Durhams; feed hay, corn fodder, and about a peck of meal, about equal parts corn and cob meal and about 3 pints cotton-seed meal in 2 feeds, night and morning; set in open cans in cold water about 45°; churn in a barrel churn; wash in granular form, first washing at 45° and later ones at 60°; salt in churn; work with a lever about 5 times and put at once into print form, and next day into trunks and send off.

Class 4, best twenty pound tub of creamery.—A. D. Evarts, Vergennes, 1st prize. Forty Jerseys; hay, corn meal, oats, bran and cotton-seed meal; use De Laval separator; ripen by the addition of sour cream from last churning; churn in square box by steam power; wash once in brine, and clear water twice; salt in granular form, Ashton; work once with a Reed; market in tubs and prints.

Springfield Creamery, 2d prize. About 300 cows; Cooley system; cream slightly acid; use Davis' swing churn 1 hour; wash in granular form; Higgins' salt, 1 ounce; work once; market in prints.

Ferguson Brothers, 3d prize. Cows Native and Durham; feed hay, cotton-seed meal and brewer's grain; use Danish Weston separator; cream fully ripened; churned in Ferguson's factory concussion churn; washed in granular form; Higgins' salt; washed twice; market in tubs and prints.

Class 5, A. A. Storrs, South Randolph, 1st prize. About 150 Native and Jersey cows; milk set in Cooley Creamers; cream ripened till it becomes thick and quite acid; churned with Franklin county churn 10 minutes; washed in granular form; Higgins' salt, 3-4 ounce; washed twice; marketed in prints.

J. S. Reynolds, 2d prize. About 300 cows; use Danish Weston separator; cream ripened till slightly acid; churned with rectangular churn 40 minutes; washed in granular form with brine, salted with Ashton salt, 1 ounce.

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#### METHODS EMPLOYED BY WINNERS OF CHEESE PRIZES.

Dairy, plain.—J. H. Riley, Sheldon, 1st prize. Native and grade Jerseys, 65 in number; feed, pasturage and corn fodder; night's milk cooled in vat to 60°, by running spring water through all night; add morning's milk set at 86°, to coagulate in 40 minutes; cut perpendicularly lengthwise and crosswise; stand 10 minutes; cut horizontally; heat raising for 1 hour to reach 99°, stirring gently; cooked by acid test; salted 2 1-2 pounds per 1000 pounds milk; made September 1, 1888.

Mrs. C. H. Clark, Underhill, 2d prize. Twenty-six Devon and Ayrshire cows; feed plenty of good grass; 10 or 12 pails of milk are strained into the vat at each milking, and the curd run up twice a day; cut up the curd in about half an hour after setting; use home prepared rennet, and Higgins' salt, one tablespoonful to a pail of milk; press 48 hours.

The same lady, Mrs. C. H. Clark, took 1st prize on DAIRY SAGE CHEESE which was made in the same way, except the juice from green sage leaves and pigweed were added to the morning's curd, the night and morning curds being mixed and pressed together.

J. C. Oliver, Charleston, 2d prize. This cheese was made from whole milk; night's milk set in pans, in morning skimmed, the cream heated nearly to scalding, and all put with the morning's milk; the milk when ready for the rennet should be about 85°, and after the rennet is thoroughly stirred in let it stand for one-half hour; then cut the curd with a knife; then let it stand 20 minutes; then break with hands until the whey settles; then draw the whey and heat, and repeat three times; then when the curd is scaled so it will squeak between your teeth, draw off whey, salt, and put to press when cool.

Factory, plain.—Essex Cheese Factory, Essex, 1st prize and sweepstakes. This cheese was made by the Cheddar system, from night and morning's milk; rennet added at 86°; heated to 98°; allowed to cook from 1 1-2 to 2 hours; vat then tipped and whey drawn off; curd packed to sides of vat to drain when changed; run through curd mill, and salted at the rate of 1 1-2 pounds to 1000 pounds of milk; vat always kept covered during the process. Use Hansen's rennet extract, and Higgins' salt.

H. Johnson's Factory, Williston, 2d prize. This cheese was made by the American system; night and morning milk, full cream; heated to 86°, when rennet was applied; stood one hour, when cut fine; heated to 98°; remained in the whey 3 1-2 hours, then whey drawn; tested with hot iron; salted, 2 1-2 pounds salt to 1000 pounds milk; cooled to 90° before salting.

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#### FACTS DEDUCED FROM THE BUTTER EXHIBIT.

The average score of the forty-one samples of butter exhibited last year was 82, and the average of the sixty samples this year was 85. This indicates favorably of quality, but for purposes of comparison it would be well to have the same judge year after year. Twenty-two of the exhibitors fed cotton-seed

meal, and their average score was 87 1-4. One fed linseed meal, and his score was 94. Five fed ensilage, and their average score was 86 3-5. Two fed hay only, and their score was 60 and 68, no other being nearly so low except one, who has omitted the mention of feed altogether. The nine samples winning the prizes in the three dairy classes were from Jersey herds.

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#### THURSDAY EVENING SESSION, January 17.

The evening session was opened with music by the Howard Opera House Orchestra. A well filled hall greeted Mr. T. S. Gold, Secretary of the Connecticut Board of Agriculture, who delivered the following address :

#### PRACTICAL EDUCATION FOR FARMERS' BOYS.

Practical Education for Farmers' Boys is given me as a topic, but this is too narrow for the view I desire to take, and I ask the privilege of taking the wider range allowed by the title—"EDUCATION FOR THE FARM."

In so extended a subject of course I must omit many things that suggest themselves, and will confine myself to a few simple propositions sustained by my own experience as a student, a teacher, a farmer, and as officially connected with various charitable and educational institutions that have more or less connection with our subject.

I. Agriculture feeds and clothes the world ; hence, all are interested in its success.

II. Agriculture is a science and an art, and hence requiring for its highest success the happy union of both.

III. All share in the benefits arising from improved agriculture ; hence, any well-planned outlay of the State for this purpose is not class legislation, but should be cheerfully borne by all its citizens.

The first proposition is too plain to need any illustration, but all must yield assent to its truthfulness and universal application.

The second will be equally clear when carefully studied.

The art of agriculture consists in the various acts of the farmer in plowing, cultivating, and harvesting his crops, in breeding, feeding, and training his domestic animals, in utilizing as best he can the varied resources of his farm. Science



comes in to make these labors intelligent, to lighten the toil, and by showing the why and the wherefore by using the brain as well as the hands, to overcome difficulties and win success in the face of dangers that overwhelm a craft with less braces and ballast. We can not separate the one from the other. As science alone never raised a grain of wheat or a blade of grass, so art alone is powerless.

EMBRACING THE AID OF SCIENCE TO IMPROVE THE ART OF AGRICULTURE IS THE WORK AND THE GLORY OF THIS DAY.

Why, then, are we called upon so often to deplore the depressed condition of agriculture, its unequal pace with the progress of the age? If there is any ground for these charges, are they not due to the fact that other callings, commerce and manufactures, have more readily and rapidly seized upon these advantages, and hence have seemingly outstripped agriculture in the race?

But, after all, what would be the use of all the enginery of commerce and manufactures if agriculture had failed to furnish the raw material as basis for their industries? Their ships would have rotted at their docks, and their spindles would have rusted in their mills, and all their money, could they have gotten it, would have failed to provide their tables with those luxuries which are now considered necessities even by the humblest artisan.

Agriculture, by the aid of the railroads and other avenues of commerce, feeds the great cities and towns, and renders their existence possible; and they in turn send back to the remotest hamlet the products of their industry and skill.

Some fifty years ago a young gentleman from New Haven expressed surprise at seeing a piano in one of our rural towns, "so far from the city." Now are we surprised when we find in out of the way places the best magazines, musical instruments, and above all the omnipresent sewing machine, getting ahead of the clock? I am not, for I have found them in the lumberman's camp, in the cumbersome, slow-moving wagon of the pioneer, in the dugouts of Kansas, and the log houses of the Indians on their reservations, and these things have all been paid for by the products of the soil. Mother earth feeds us all. There can be no conflict between agriculture, manufactures and commerce. They are parts of the same body, and when one part suffers, all suffer with it. As in agriculture, one farmer honestly gets the better of another farmer by greater industry and skill in his calling, or dishonestly by greater sharpness in trade. So those men as individuals, or a body engaged in manufactures or commerce, may attain more than their average

share of this world's goods by honest industry, or by taking unfair advantage of others in the same business as themselves, but more often this takes the form of a banded interest to control the market—a corner, a combination, a trust.

While co-operation to secure wholesale rates is a legitimate means of saving to farmers as well as others, all combinations to control the market so as to remove it from the natural law of supply and demand, interfere with all legitimate business, and are contrary to moral, if not statute law. A manufacturer may justly hold his goods in his warehouse till the season demands them; so the farmer, if the market were overstocked, might hold his fruit or grain for better prices. Unless some should do this, woeful want would at times afflict a whole community. As most farmers' products mature but once a year, or at least have their natural times of abundance and scarcity, this is a legitimate means of procedure. A farmer may thus benefit himself by securing better prices, may benefit his neighbor by giving him the market without competition, and his customers by preventing exorbitant prices in times of natural scarcity. Whenever fruit will not pay for gathering, milk or other perishable products will not pay for transportation, to neglect the more allow them to go to waste is permissible; but better by some device give them to the poor, sometimes even paying the freight rather than allow such waste. Unhealthy meats and fruits are justly destroyed by the authorities; but I have little patience with that "dog in the manger" spirit that will withhold from the poor these bounties that are beyond the power of the owners to utilize, or will destroy them with the hope of advancing the price by lessening the supply. The farmer can go out of the business, sell his farm, refuse to plow, sow and reap, but with the farm in his possession, or crops planted and cultivated, he can not "strike" or "lock out"; he must go on, though the crop or product brings a ruinous price. Should "the earth withhold her increase," or the farmer "strike" or "lock out,"

HUMANITY, WITH ALL THERE IS OF HAPPINESS IN THE WORLD,  
WOULD PERISH, AND CREATION BECOME A BLANK.

This mutual inter-dependence, or dependence upon each other of these great branches of human industry, teaches us never to seek the growth or good of one department at the expense of any other. Rather let them all work in harmony with each other, co-operating for the highest elevation and blessing of humanity.

The word *co-operate* brings me to another idea. We hear much about co-operation among farmers. This is all very well

as far as it goes, help your neighbors first ; but we have shown that we need to co-operate with all other departments of human industry, and farther than this, there is something which is not called an industry, though its votaries are the most indefatigable class of workers. That is science. As the earth is given to man to till and subdue, so all the powers of nature are given to his control whenever he has fathomed their mysteries.

As servants of the Creator we must give an account of our stewardship. Heavy responsibilities rest upon us. We can never meet them till we accept science as our handmaiden, our guide, and with her aid there is no reason why agriculture, which as a science employs and embodies all the sciences, should not only take and hold the foremost rank among all the physical labors of man, but should so draw from all the stores of knowledge of the wise and good as to restore agriculture to the dignity with which it was endowed in Eden.

But what has all this to do with education for the farm ? Agriculture being both an art and a science, the highest success can be attained only by proficiency in both. We can not say that there is any better place to teach a boy practical agriculture than on a well-managed farm. The animals, the crops, all the operations of the farm, the good and bad plants, noxious and beneficial insects, birds, fishes and reptiles, all furnish him daily object lessons, so that the first fifteen years may be well spent in their study, with such moderate instruction from books as may be necessary to enable him to classify what he sees with his eyes and handles with his hands, and give him a taste for further investigation. His muscles are trained and developed by the daily labors of the farm, adapted to his age and strength. *Planning* for the future has ever been before him, and he takes practical lessons when he tries to raise a chicken or a calf. Necessity has made him fertile in expedients. He is ready to undertake anything, whether to catch an animal or storm a snow fort, and his success fills him with joy and hope. Now we have only to point to the graduates of this school to show what it has done for its alumni. Farmers, do you realize the advantages your children—both girls and boys—may have in their birthright to learn all these things on the farm ? But by this time the boy should be prepared to decide upon some plan for life. His tastes should be consulted, and with a wise guidance he should be led early to choose some vocation in life, and be preparing for it.

But the demands of society, of citizenship, of manhood, require in these days some education which the farm can not furnish. As we have before mentioned, all the sciences unite to form the science of agriculture. I have only to name them,

and you see at once their relations to agriculture. Chemistry, Botany, Entomology, Zoology, Geology, and all the other "ologies," and Physics or Natural Philosophy and all the other "sophies," furnish knowledge of daily use on the farm.

As agriculture is the foundation of all material strength, so the investigations of science in return have most blessed mankind when subservient to this art, the parent of all arts, to this science as king, to whom his subjects bring their best gifts.

When agriculture claims this high prerogative, that is, when individual farmers grasp the idea and make it a reality, cease groping in the dark and walk in the light, co-operate not only with each other but with all other departments of industry, accepting them as handmaidens in subduing the earth, in controlling the powers of nature, then the dignity of agriculture will need no meretricious decoration, for agriculture will stand acknowledged sovereign under God, and by divine ordinance, as exemplifying the power of the Creator in the material world.

Our farmers' boys, like other boys, while pursuing their studies would prefer some games and athletics, to sober, steady work; and this is all right, if not allowed to interfere with the great work of life—the doing of one's share in the industries of the world; WORK by head or hand, or both, so that the world shall be the richer, the better and the happier for our having lived in it.

To so arrange this matter that mental and physical training shall go on together, is

#### THE PROBLEM OF THE AGE.

The world has been governed by physical strength—the power of the body, more often by cunning and shrewdness, sometimes by learning—power of the mind, but to-day all these forces must be united to insure success. To make the perfect farmer, skill of the hand must be guided by a trained intellect, and justice to himself and his fellows demands moral culture, that he may fulfil his high destiny.

Life is too short to allow these different departments of preparation for lifework to be separated. They should go on contemporaneously, that we may have a shapely and enduring structure.

There is a period in the life of man peculiarly adapted to learning, either in the case of the hand, the head or the heart. This is the period of youth; not that these processes do not go on through life, but there is a much greater adaptation to them at this period. That neglect, then, can never be overcome.

The farmer, of all others, must have persistent industry. He is his own taskmaster. The changing seasons, the demands of his crops and his animals require his exertions, while the wants of himself and his family are the life-giving stimulus to the whole. Trained on the farm, he gets this discipline to its fullest extent. The *boy* must supplement whatever is wanting in the way of labor, and whatever is left undone at night is made his task. This often proves too much of a good thing, and he leaves the farm in disgust, not because he has not the ability to make a good farmer, but because he has found the physical part of his nature exhausted by these constant demands, which allow no development of his other faculties, and he hopes elsewhere to find such opportunities. Now, the parent of the boy of fifteen feels that he should give his son some better opportunities of education than he has enjoyed himself. There is the High school and the Classical school open to receive him, but the father and the mother know that the education there for their sons and daughters is not *for* the farm, but *from* the farm. Even our school-books of the present day, made by those who have little knowledge of rural life or sympathy with it, are expurgated to the degree that Noah Webster would hardly recognize a primary reader or spelling-book as now approved by school committees. Hence, if there is an earnest desire to keep the child on the farm, and one is selected thus to forego the privilege of education which brothers and sisters may enjoy, is not this enough to make that boy or girl dissatisfied with farm life, and to resolve that all their children shall be educated off from the farm—that is, led to adopt, or fitted by education for other employments?

As much mental discipline can be gained in the study of the natural sciences, as in other departments of human learning, while at the same time the eye and the hand—the first the recipient organ, and the second the eccentric organ—are trained in exactness and efficiency. In connection with these studies, to show their application to agriculture, there must be practical illustrations. The student must apply on the farm what he has learned in the laboratory. After a few hours of vigorous study, the mind is weary and needs relaxation. To get this rest, and at the same time apply this learning in practice, is secured by “practical education.”

In the study of insects, follow the teacher to the orchard or the garden. There is scarcely any time of year that some practice may not accompany teaching.

Botany is a dry, hard study, without the living specimens. Their natural methods of seeding and propagation, how to favor or prevent their increase, are impressed by practice.

Add to this that skill in manipulation can only be gained by long practice. The muscles become stronger, more efficient by use, and lose these powers by neglect, and some manual labor should accompany every effort of education for the farm.

But those who are to form the next generation of farmers are not all farmers' sons; they have not all the opportunity of the object lessons and the physical training of the farm. *They* especially need this physical, united with mental, instruction. No one desires that all farmers' children should remain on the farm; but it is essential to the honor and development of agriculture that those who practice it be well equipped for the work, and this brings us to our third proposition, that it is not "class legislation for the State to encourage agriculture."

When any call is made for legislative aid to agriculture, "What do you farmers want? Do you want the earth?" Yes, that is just what we want, what rightfully belongs to us; but we want it, not for ourselves alone, but that we may use it for the common benefit. Every improvement in agriculture, whereby more abundant crops, more delicious fruits, more useful animals are raised, benefits not the cultivator alone, but from the nature of the case—not from his own generosity—extends to the whole human family, who rejoice and prosper in proportion to the bounty of the harvest. Statistics of marriages, births and deaths, in those countries where the food supply is a more vital one than it has yet become here, show that marriage, a Heaven ordained ordinance, that fruitfulness in child-bearing, that health and long life, have direct relations to the abundance and quality of the products of the earth, marking periods of abundance or scarcity. Other industries will not, can not thrive where agriculture is neglected.

Ignorant agriculture is on the high road to neglected agriculture. The almost spontaneous production of bounteous crops by a virgin soil allows for a time apparent success with very little skill; but the State never can wisely allow any system of agriculture or other employment that drains its resources and saps its strength. A farmer may make money by skinning his farm (you understand what that means), but this should never be the policy of the State. Its life is perpetual. It should guard the interests of posterity as carefully as it protects those of its living citizens.

The State will be benefitted by a more successful agriculture. For this end, agriculture must be more intelligent. The true statesman, the lover of his country, both now and hereafter,

will see the wisdom in such a system of instruction in agriculture both as a science and an art, as will benefit not only the present, but future generations.

There is no true antagonism between the different lines of human industry. All should unite in their common development, to share alike in their common benefits.

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This address was followed by another by Mr. A. W. Cheever, editor of the *New England Farmer*, as follows :

### FARM EDUCATION

Is a short title, but it is capable of covering a wide field of investigation. The young man who proposes to follow farming as an occupation in these days of close competition will find a number of serious problems to solve before he will find himself on the sure road to success in his chosen pursuit.

The belief is very general, I think, that farming, especially in these older States, is not as remunerative now as when our fathers and grandfathers cleared and first cultivated these hills and valleys, and when the soil was rich with the ashes of recently burned forests. I think the same belief in "the good old days" is also found among men of other callings than that of the farmer. The men at the head of old business houses in our cities, though having made fortunes themselves, see but little encouragement for young men to start business in their line now. The big concerns feel that their success is due largely to the momentum of a well established business, while the smaller ones complain of being crowded down by a few monopolists who are endeavoring to entirely control the business of their locality. But I think this is rather an old man's notion, or one peculiar to men who have passed the meridian of business life, and are losing the courage and ambition of younger days.

I am not willing to believe that there has ever, in the past, been a time when a young man or a young woman should rather have lived than the present. If there are any young people in our beloved New England who do feel that way, they can easily set themselves back by adopting the modes of life of earlier times. I know of no restrictions against building log houses with a stone chimney and a single window now if one chooses to do so. I saw in Dakota last summer, many families who appeared quite contented in houses made of cotton sheeting stretched over poles, and with neither chimney nor the

one window. I am sure that neither the fathers, mothers, nor the young people of those families work as hard or as steadily as do the members of most New England homes. If it is harder to earn one's living now than in days gone by, it is chiefly because we want more than did our parents and grandparents. I can not believe that the introduction of steam power into the world, increasing human power many fold, can have made the world less desirable to live in.

It is often said that we are in a transition state, just between hay and grass, as it were; that we have not yet become adapted to the new conditions. But is this any more true now than at any former period in the history of man's development? We are in a transition state at all times, and life is a constant struggle towards a better adaptation to surrounding conditions, and it seems to me that he is best educated who is best qualified to meet the conditions of life and to turn them to the best advantage.

The world is often spoken of as being divided into two great classes; some of the clergy used to divide us into the elect and the non-elect. Autocrats see the world divided into rulers and subjects, or the nobility and peasantry; politicians in our country expect us to be either Republicans or Democrats, though of late the sorts have been somewhat mixed, but men of letters divide us into the educated and the uneducated, and by many the line is drawn at the college door.

In the days of my early boyhood, the clergyman, the lawyer, and the doctor were the only men in town who were deemed fit to fill a place on the school board, and in many towns it was rare to find men of any other class acting in this capacity. This was perfectly natural and perfectly right, too, at the time, but from that custom must have developed in the minds of the public certain ideas which later developments have overthrown, or, at least, greatly disturbed. With

#### COLLEGE BRED MEN FOR SCHOOL SUPERVISORS,

It was the most natural thing in the world for the common schools to be looked upon as the feeders of the college, and to have the courses of study shaped in that direction. The school committee-man when visiting a school and looking over the "stock," naturally noted with pleasure such as gave promise of becoming candidates for the college, and thus for a place among the educated class. These alone, in after life, were expected to be "heard from."

True, it was usual to tell the school that the highest places were open to all, and that for the lowest boy the President's chair in Washington was waiting, provided he made the best



use of his opportunities. But of course a good deal of this was only talk, on the part of men who knew as well as we now know, that but a small proportion of the boys in any of our common schools will ever astonish the world by their public achievements. The much larger number will be comparatively lost in the great army of industrial workers, who, though inconspicuous, are, after all, the real every day life of the world. In those days a boy not quite bright enough to go to college was encouraged to learn a trade, but if he showed no special aptitude with tools, he was still bright and smart enough to make a farmer. About all the learning then deemed necessary to the management of a farm was to know when to plant and sow, when to reap and mow, and when to slaughter animals, wean pigs, or perform the necessary surgical operations of the stock-yard, and all these things could be easily determined by consulting the "Old Farmers' Almanack," particularly the tables of the moon's changes, and the half disembowelled human figure showing from day to day the whereabouts of the "signs." The weather probabilities, such as

"LOOK OUT FOR SHOWERS ALONG ABOUT THIS TIME,"

In July, and for frosts later on in September, were also consulted with a trustful confidence.

For a young college graduate to have settled down on a farm then would have been looked upon as the throwing away of opportunities. Education would have been considered by many as wasted, if used in agriculture, because anybody could be a farmer. No school committee-man ever took pains to tell me that farming or any other kind of labor requiring the use of the muscles as well as the brains was something worthy the efforts of a boy who had enjoyed the privileges of a high school or college education. I well remember one committee-man who told a graduating class that he hoped that in the years to come it would never be his sad lot to find any member of that promising class working with a shovel at the tail of a tip-cart. They should look higher; some, he hoped, would aspire to that noble profession—the bar, as if the defending of a rum-seller, caught breaking the laws of the commonwealth, was a more honorable business than building a street or spreading manure on a garden or cornfield.

I have no words of condemnation for our colleges. I am proud of them and of the spirit of the men who founded them in the early days of our country's history, and as I mingle with men of the world, I am more and more made to realize under what disadvantages I have myself worked from the lack of a college training. But farms whose balance sheets at the end

of the year show a gross footing of less than a dollar for each working day in the year, do not send many boys to college. An examination of the census returns will show that, taking all the farms in New England, the average annual gross income of the farmer is but a trifle over \$600, or about \$2.00 per day for the working days. Not many mechanics working for \$2.00 per day find means for sending their boys to college. In the main,

#### COLLEGES HAVE BEEN FOR THE WEALTHY

or well-to-do classes. True, there are exceptions, and remembering these, college officials are apt to claim that any boy who really sets out that he will have a college education, can usually find some means of getting it. It is also true that some of the boys who are obliged to work under the greatest difficulties in securing a college education are the brightest students, and become the most useful citizens in after life. The late President Chadbourne used to say: "Never *send* a boy to college, but if he has made up his mind that he must and will go, then assist him; but don't send him there against his will or inclination, thinking that the college or its professors will ever be able to make a scholar or a superior man of him." President Chadbourne, in his long experience in college life, knew that the majority of the boys who enter our classical colleges are sent there by wealthy parents. The custom of hazing never started in a class of poor boys who had learned the value of money by working for it upon their fathers' farms. Our agricultural colleges, located as many of them are, away from the great cities, are not as costly to the student as are the older and more popular institutions.

In some, tuition is nearly free, but there are other expenses beside tuition. Few farm boys are so situated that they can attend an agricultural college and board at home, and board bills constitute no small item in the total cost. I am unable to state the average cost of an agricultural or other college course in New England. I know that fifty years ago, when a dollar went further than it does now, an old neighbor of my grandfather's said that it had cost a thousand dollars to make a fool of his son. Including the value of a young man's time spent in college, I think no father should calculate upon a smaller sum than a thousand dollars as the probable cost of a three years' course in any college in New England.

Now there are a good many farmers in New England who can afford such an expense for educating boys at college, and it may be money well spent, but there are a great many more who can not afford it. There are apt to be too many boys in the family in proportion to the thousands of dollars. According

to the United States census, there are in New England over 200,000 farms, and there is or ought to be, at least one boy in every farm home. How many of these boys could find accommodations now in the colleges of New England? Certainly but a comparatively small number. Taking things as we find them, it is very evident that the great mass of farm boys here in New England are destined to obtain such education as they do obtain in some other way than by a training inside of college walls. Now, as a college education can not at present be the rule, let us, like the fox in the fable, see if we can not get a little consolation by calling the grapes that are just beyond our reach, sour grapes. We have already seen that the college is limited in its sphere, and can aid only a very small per cent of the boys who need an education.

But how about those it does educate? Is the college meeting the expectations of its founders and friends? Do its graduates make better farmers, or more contented farmers, than were their fathers? Do they make farmers at all? The annual catalogues must answer. A few do; more do not. The great cry for many years has been, How shall we keep the young men on the farm?

#### THE AGRICULTURAL COLLEGE HAS THUS FAR FAILED

to answer the question. But my faith is strong that it yet will answer it, in an indirect if not in a direct way.

There is not a college to spare. I wish there were two, or ten, where there is one now, and that all were full. But it is too soon yet to see much of the fruit that these institutions are to bring forth, and much of it will come in forms and ways we had not looked for. The agricultural colleges began operations with little but a place and a name. The teachers and the textbooks had to be made, and the supply has never equalled the demand. We would not expect great or immediate results from a mechanic or manufacturer, however skillful, if he had to make all his tools before beginning the manufacture of the market product. We must not be too impatient of results from our colleges while the tools are being made with which to run them.

Then the new Experiment Stations, which are founded expressly, as we suppose, to aid the farmer, are but an annex to the college, and must also be supplied with working material, nearly all of which the college will have to furnish. So, for some time yet, as in the past, the corn, potatoes and beans, the beef, pork and poultry, and the garden fruits and vegetables will be grown chiefly by men and boys who have had no college training to aid them in making farm work profitable or country

life attractive. There is another influence, too, felt by nearly every farm boy who attends college which operates against making him a farmer after he graduates. To a boy trained to work in the sloppy cattle yard, or in the hot, dusty hay-loft without murmuring, a clean recitation room, presided over by polite, well-dressed professors, and filled with bright, ambitious boys just verging into manhood, presents a contrast that is for a time, at least, likely to place the sweat and humdrum of the farm life somewhat at a disadvantage. Nor is the contrast lessened when the student learns that his teachers are receiving annual salaries that exceed, in many cases, the assessed value of the entire farm outfit he has left behind for the old folks to run during his absence. Many of the influences and surroundings of the college at the present time, even though it be an agricultural college, have a tendency to turn the face of the student *from* rather than *towards* the farm.

I am not arguing against the higher education of the college, especially of the agricultural college. I wish that more of the country boys and more of the city boys born of good working families could avail themselves of their advantages. If, as is claimed, we are annually expending \$17.00 for alcoholic liquors and tobacco for each single dollar devoted to educational purposes in this country, it is no time to speak against colleges and public schools, unless it be to charge them with negligence of duty in not having long before this corrected the evil. No money is better expended than that which enables one to clearly learn the conditions surrounding him, and how to adapt himself to those conditions. The colleges certainly help do this, especially those that deal largely with science and with things. I think I am justified in saying that the tendency of a college education has been to make the graduate feel that he had a calling in life considerably higher than that of the average worker; that a college-bred man should aim to get his living by his wits; in short, to get it out of other people who know less, rather than out of Mother Earth herself. I do not like that doctrine at all, nor the daily examples of its influence upon the community. Carried out to the full extent, it leads to selfishness and monopoly in their worst forms.

But not to dwell upon the evils connected with college training,

#### WHAT CAN WE DO FOR THE NINETY AND NINE

young men in every hundred who can not obtain a college education? What can be done for the farm boy and farm girl who must spend their youthful days upon the more or less isolated and not over profitable paternal homestead? They

have the common school, largely controlled, as we have seen, by men who look upon the college as the stepping-stone to most of the high or desirable places; who think that a little knowledge of the three R's is enough for those who are ordained to earn their bread by the sweat of the face; men who rarely labor themselves, and who can not divest themselves of the notion that there is a wide difference between a profession and an occupation.

Thus far we have had one agricultural school in New England, and only one, to my knowledge, where the aim has been to keep the farm uppermost in the minds of the students. I refer, of course, to the Storrs School in Mansfield, Connecticut. The course is short, only two years, long vacations being taken during the summer months, thus enabling students to help their fathers at home at a time when their services will be of the greatest value.

The corps of teachers is small, and the branches taught are such as will most aid or encourage the practical farmer who expects to obtain his living from the farm, and probably a surplus towards sending in turn his boys to a similar school by-and-by.

This is the only agricultural school I know of where all the graduation theses are confined to agricultural topics, and as a result, the boys who attend the Storrs School do not readily snap the chain which naturally anchors them to the soil of the old farm which has nurtured them. But only Connecticut boys are eligible to admission, and they keep every seat and sleeping room occupied.

A similar school should be established in every State, better in every County, or possibly a modification of it in every town. Some would say that the common school should teach agriculture; perhaps so, but it doesn't. Perhaps it should teach the use of the plane, the saw, the trowel and the needle, but it doesn't. The time may come when the tax-paying voters may decide that public money is well spent that fits every young person to follow some useful pursuit, but it has not come yet. The aim of the public school is to lay the foundation, not to complete the superstructure.

The often used term, "finished his education," is a misleading one; no graduates of any school of boys or girls have finished their education. They have done well if their training has started them in the right direction. Education is a lifelong work, and that student, whether in school or in college, is doing well who is *learning how* to learn. There is no doubt that the common school system and the text-books used could be improved, and will be when men of experience from agri-

cultural and technical colleges and the women of the country shall have a voice in shaping them. They will see that reading books shall contain more familiar talks about fruits, flowers, birds, insects and common things, and fewer political speeches; more simple stories tending to inculcate correct ideas of behavior and personal obligation, and fewer accounts of the exploits of warriors and adventurers.

At best, school days are short and soon passed, particularly to country children who never get much beyond the public school. But there is time for a great deal of training outside of school-house doors. Parents can do much by placing the right kind of books and papers in the hands of their children. We have a great many men in this country classed as self-educated or self-made. Somebody has said that a self-made man is much inclined to worship his maker. Well, a man has a right to have a little personal pride in his work if he has done good work. But the truth in the matter is, that every man is more or less self-educated; knowledge is never inherited, nor is it transferred by will. Men who would know much must work much. Every child should early

#### ACQUIRE THE HABIT OF READING SOMETHING

In the form of a newspaper, something that appears regularly and will be looked for. The post-office should be looked upon as an open door to the outside world. The child who has learned to value the post-office and to use it, has learned how to live in a country place without being continually lonesome. Of course there is a great difference in newspapers, and parents can not be too careful in their selection. Letter-writing should be encouraged in every family of young people. Money spent for writing materials and postage is well spent. The most profitable writing lessons I ever received were not given in the public school, but by an outside teacher who knew how to teach writing better than he knew anything else. More was learned from his short, special course than had been learned from the half-hour exercises in the public school under indifferent instruction in a dozen years. I believe in these special schools as much as I believe in special farming, and I believe they can be extended profitably in other directions. We ought to have young people's classes in botany, in entomology, and mineralogy; not merely to learn the names of plants, insects and stones, but to learn of their character and value. We ought at least to be able to distinguish among insects the beneficial from the injurious; should know enough about plants to distinguish the poisonous from the useful, and of plant growth to understand what our crops require, and how to most easily

destroy weeds. Of stones we should know enough to be able to judge fairly of the quality of a farm, seen even in winter. All these studies can be made exceedingly interesting by teachers who have special tastes for their study and a happy faculty of imparting what they know. Our agricultural colleges are beginning to turn out graduates that are familiar with these subjects, and the time ought not to be far distant when young men or young women could find it profitable to open afternoon or evening schools to teach these useful studies, at least in an elementary way, going round from town to town, or district to district, devoting a session to each, once a week for a longer or shorter term, according to the interest manifested.

I presume there is much more of this out-of-school teaching than many are aware of. There is the Chautauqua system of teaching through correspondence alone. Classes are formed of persons of all ages living anywhere where the mails go; books are selected for courses of reading and study, and examinations made through printed questions and written answers. Religious or benevolent men and women of some leisure are quietly rendering their lives widely useful by taking charge of such classes at merely nominal rates, or just enough to make the student feel that he is paying for what he gets. There are no fixed terms in this school, but one may begin any time and continue for as long a time as seems desirable.

Then the Grange, the farmers' own organization, is doing a great work in educating the farmer and his family, one of its aims being to continue the educational period through life. It receives the boys and girls even before their school days are ended, and puts them in the same class with mothers and fathers and older brothers and sisters. Men differ in their ideas regarding the forms of Church worship, but there are no two opinions as to the influence of Church attendance upon young people, who are thus for a few hours each week put upon their good behavior towards each other.

#### THE GRANGE ADDS ANOTHER OPPORTUNITY

For cultivating our better and higher natures, and it is an organization in which country people, of whatever religious sect, or of no sect, can join on common ground and work together in harmony and for the mutual good of all. If not so already, I believe the Grange is to become the best high school within reach of the country dweller. It is taking the place of the old fashioned lyceum, which was an institution too valuable to be given up without adopting a better, and it is or may be, an improvement on the too often prosy Farmers' Club. The

Grange must have women as well as men, and no system of education can be complete that provides for the education of one sex alone. The farmer's wife is as indispensable to success on the farm as the farm-house, or as the farm itself, and if farm life is to be a life worth living by a man, it must be made worth living by the women and children. The Grange recognizes equality of the sexes, and the regular attendance of any farmer's family at the weekly or semi-monthly meetings, will make men and women forget that society ever made any distinction between them on the score of rights or of grade. The Grange trains the young to think on their feet; to respect accepted rules, and to

#### TALK SENSE IN THE PRESENCE OF SENSIBLE COMPANIONS.

There are a few simple ceremonials which are observed at every session, scarcely more than enough to remind members that they belong to an organization of men and women pledged and bound together as brothers and sisters; as one has beautifully expressed it, "The seed thought of the Grange was brotherhood." Its aim is not to elevate a few, but to lift all to a higher plane.

The Lecturers of some of the State Granges are planning to enlarge and extend the educational features of the Grange something after the Chautauqua method. Lists of books will be named which farmers and their families should be familiar with, and they will probably be furnished by Grange co-operation at reduced prices, so that a little money will go farther than if the purchases were made individually.

There are other organizations, particularly of women, that have been working for the same end, securing a better education for those who can not attend college, or who are past school days. A society of ladies in my own town are studying the laws relating to suffrage, intending to be ready to vote and act understandingly when the full franchise is granted to women, as they expect it ere long will be.

Young people on the farm can learn a great deal by

#### THEIR OWN INDIVIDUAL EFFORTS.

Our winters are long, and in winter the evenings are long, and there are a good many rainy days during the busy months of the year which may be utilized by reading and study. I have known farmers' boys who worked at home in summer and attended school in winter to keep sufficiently well informed as to the progress of their class, made up of village children who attended all the terms, to be able to join in at the winter term



and keep along with their class. I have also known boys to take up such studies as botany, mineralogy or chemistry, and, making much of their own apparatus, make such progress as to be able to enter college a year in advance in the ordinary course. There is no necessity for a farm boy of average intelligence being behind the village or city boys who are kept, perhaps, too closely in school. Nor will boys who early learn to mingle study with labor be likely to neglect the practice afterwards, but will be students through life. Too constant attendance at school or college may cause a boy at graduation to throw books and study all out of mind so long as to make it hard to begin again.

It has been the pride of Germany that her boys are all taught to read and write. In an examination of the German army, it was found that only one soldier in a hundred had not learned to read and write before entering the service; but it was also found that two in a hundred while in service had seen so few books that they had actually forgotten how to read or write. Our American people, thanks to our free press and cheap postage, keep up their interest in letters better than that. I wish to say here to fathers and mothers that if you can get your young folks interested in any useful branch of study, do not feel that the time devoted to it is time thrown away. If a boy is making a study of insects, or plants, or minerals, and steps from his work a few moments to add a new specimen to his collection, do not censure him too harshly. And if a few of your boards and nails or screws find themselves in combinations that you did not order, do not feel that they are all wasted. I wish every farm boy could spend at least one winter under a competent machinist or joiner, in learning the use of tools, and the strength and properties of material. A wealthy gentleman of Philadelphia, recognizing the value of such experience to a young man, is establishing a school of mechanical trades in his city where classes of young men between the ages of twelve and eighteen are to be taught the use of tools, so that at graduation they will be able at once to find remunerative employment at their trades. The course will last three years, and the students will be bound as apprentices, board and tuition both being free.

If the "Trades Unions" continue to limit the number of young men who may learn a trade by regular apprenticeship, there must be some means provided for the great multitude who, unless taught how to support themselves, must become a burden upon society. In the rush of modern civilization towards the so-called highest places, I fear that too many of us are inclined to overlook the opportunities for

## HAPPINESS IN THE COMMON WALKS OF LIFE.

Great men become great only by great efforts. In many cases we may believe that their distinction costs all or more than it is really worth. To one who has learned to be reasonably content, and yet tried to make the most of it, private life is well worth living. The late Edward Everett, who made his name a household word in every American home, in an address delivered to the citizens of his native town of Dorchester, referring to it as being the place where his honored father was born, and grew up to manhood in a humble sphere, said, that, "As I come back to breathe the native air of my race, I must say that with the greater experience I have had of the cares and trials of public station, the more ready I am to wish that it had been my lot to grow up and pass my life in harmless obscurity in these peaceful shades, and after an unobtrusive career, to be gathered to my sire in the old village graveyard, where

'Each in his narrow cell forever laid  
The rude forefathers of the hamlet sleep.'

If men of great abilities long for the peace and quiet of private life, why should we who have fewer talents count our lives as wasted, even though spent in educating ourselves for the building of a comfortable country home on a well managed New England farm?

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At the conclusion of this paper, Mr. William R. Sessions was called upon, and briefly addressed the Association, as follows :

I think the responsibility of proper education for farmers' boys rests primarily with the boys' parents ; they should see to it that the education of the boy is started right, and should teach the boys to honor and respect their calling by honoring it themselves and making it more profitable. There is too great a tendency on the part of farmers to look down upon their occupation. We all know that there are many discouraging things in a farmer's occupation, but no more than in any other. The annals of our country are full of the lives of men who have made national mark, and national reputation, who were brought up and educated on the farm.

Give the boys a good practical education in their business ; do not confine them to mere theory.

FRIDAY MORNING, January 18.

The President introduced Mr. E. F. Bowditch, of Framingham, Mass., who, in a conversational manner, told the Association

“WHY I CHOSE GUERNSEYS.”



**LUCILLE, 115. 45 lbs. Milk Daily, 3 1-2 lbs. Butter.**

Mr. Bowditch was asked why the Guernseys had not shown larger butter records if they were superior to the Jerseys. He replied that they had not been *forced* to the extent Jerseys had been, but still had made creditable records, and referred to Lucille as one of whom he was not ashamed.

Mr. Bowditch said :

I have always been a lover of Jersey cattle, and have had the honor and pleasure of milking “Old Flora.” In 1864 I went to the Island of Jersey, and imported a herd of Jerseys, from which I got most satisfactory results. I always endeavored to avoid the use of butter color. In 1872, a few Guernsey cattle

were brought into the country, and I purchased two, and in the January following, one of them came into milk. My dairyman informed me that the men in the barn were feeding carrots to the stock. I investigated, but learned it was not the case, but that the coloring came from that one Guernsey cow. She had colored the butter made from a herd of twenty-three Jerseys to quite a noticeable degree.

In 1877 I went to the Island of Guernsey and selected a herd of Guernseys, and to-day I am running a herd of pure Guernsey cattle. I have brought with me a few samples of my butter, made up for the market. It smells somewhat of the box, as it has been packed up a few days, but you can see from it what can be done on ordinary feed. We feed corn-stalks, hay, and an average of about four quarts of cob meal; we cut the corn-stalks, and give all their feed dry. I have never fed ensilage for butter.

Originally, the Jerseys and Guernseys were one breed—called the Alderney, or Channel Island cattle. The Jerseys were bred for color; in Guernsey no attention is paid to color, and they are of all colors. The laws of the Island prohibit the introduction of foreign cattle, so that the breed is kept pure. They have been bred for results at the pail, and in consequence we have this rich milk and high colored butter. Guernsey butter sells on the Island of Guernsey at a sixpence a pound more than Jersey butter, and the Jersey butter has to be artificially colored to bring the price it does. The Guernseys are a larger cattle than the Jerseys, and in many ways more useful animals; the Guernsey is more like a rich milking Short-horn than like a Jersey. It has been said that the milk of the Guernseys is so rich in oil that the butter will not “stand up,” unless kept quite cold; I think it is because more or less oil cake has been fed the animals.

*A Member*—Have you tried cotton-seed meal?

*Mr. Bowditch*—Never but once, and came very near killing some steers with two quarts of it. I have no records here with me, and can not give my average production from the Guernsey herd.

*The Same Member*—Will it average 300 pounds per cow per year?

*Mr. Bowditch*—I should say very nearly; it is not putting it too strongly to say that the average Guernsey cow will make a pound of butter a day, or ought to make that amount. It is a very even temperature on the Island, and they have grass there almost every day in the year, and are always taken care of by women. They are very quiet, and the bulls are very quiet if properly handled. I work my bulls in the horse-power, cutting

corn-stalks. I feed grain all the year round to my cows, but to the bulls I only feed grain in the heat of summer. I always try to have my cows go dry nearly two months, but sometimes it is impossible to do it.

Years ago I colored my butter by feeding carrots, and found it very effective; but since keeping Guernseys, my butter has been complained of as being too high color, and I have fed no carrots for four years. A friend of mine once asked me if I thought feeding butter color to the cow would color the butter. I told him I had a cow giving such white butter I would just as soon have her die as not, and would try the experiment. We fed her butter color, and it did have an effect on the color of the butter. To have carrots effective, you should feed a bushel a day. I think with selected herds you can feed the Jerseys up to the color of the Guernseys by feeding carrots. There are only three or four dairymen sending butter to Boston market who do not use butter color, and they are very careful feeders.

*Dr. Hoskins*—Do you think you get in the neighborhood of 5,000 pounds of milk per year from Guernseys?

*Mr. Bowditch*—Yes. One of my best cows went up to 6,900 pounds. What you want is a good all-the-year-round cow, not one that will give an immense yield one part of the year, and then all the rest of the year you have to whistle for it. From a cow giving 30 pounds of milk, I want, and expect to get 24 ounces of butter.

*Dr. Hoskins*—Are those bulls used on a common tread power?

*Mr. Bowditch*—Yes, with shoes. It is a little bit of a "circus," but you can break and train a bull if you go at it properly. It is much more in the man who has the handling of the animal than in the bull. They should be commenced with early, and managed kindly. When I first began I had several cross bulls, but of late years I have not had a cross one. I have one now that was very cross, but now I can put my hand on his neck and say, "Go back to your place," and he will go. He is just as quiet as one of the cows.

I raise my own corn as much as I can, and use the yellow New England corn. I feed cob meal as far as it goes, and when it gets short, fill out with Southern corn. I grind it in my own mill pretty fine.

Some person in the audience asked Mr. Bowditch his reason for not using ensilage, to which Mr. Bowditch replied that that was too large a field to go into, in a talk upon Guernsey cattle.

As to the feeding—I sometimes get word from my commission merchant that I am feeding something I ought not to—to

look out. It is surprising when you are used to a certain brand of butter, how quickly you can tell the slightest deviation in the food. I had a cow giving six quarts of milk, that stole some turnips, and my whole butter of that churning tasted of turnip.

*Mr. Cheever*—Can you yoke your bulls easily?

*Mr. Bowditch*—They are very intelligent and quick, and come under the yoke readily. They are so tame that my children go and pat their noses, and it is very seldom they even get a shake of the head. When breaking them, I put on two yokes, which prevents "turning of the yoke." I believe that it benefits a bull to work him, and that his progeny will be better for it. It develops greater lung capacity, and hence stronger constitutions and less danger from disease.

*A Member*—How about exercising cows?

*Mr. Bowditch*—They take their exercise, but they do their work at the pail, and it is a great strain on the system. I believe it is good to let them out to exercise occasionally. When turned out, more than half the herd will have a game of "tag" among themselves.

*Dr. Hoskins*—Is there any danger of over-working the bulls?

*Mr. Bowditch*—Yes; but only in the extreme hot weather. When the animals begin to loll, rest them; up to that point I don't spare them; they do the hardest work, and all day long.

*President Douglas*—Do you feed cotton-seed meal?

*Mr. Bowditch*—No; I am afraid of it. I have fed it to sheep, but always at a detriment and a loss. I never feed it to milch cows. Guernsey beef is hard to sell in market, but for my own table I prefer it. It is well marbled, and has a good flavor. They are nearly double the weight of Jerseys.

*Prof. Cooke*—In regard to the matter of feed affecting the milk, I think the gentlemen did not get the idea I intended to convey. If the results arrived at by scientific men do not agree with the general experience of farmers, the probability is that the scientific men are wrong. But when we both understand each other, we are not so far apart. What I do say is, that if you are feeding an animal a full ration of good, nutritious food, and then substitute another kind, equally nutritious, that the chemist has been unable to find any change in the character of the milk, with the exception I stated yesterday, when the animal is turned out in the spring.

I am willing to make this proposition to you who do not think the statement correct. If you will make whatever change you are a mind to in your feed, and will send me samples and weights of the milk, before the change and after, I will make an analysis free of charge, and publish the results, whichever way they may be, whether in your favor or mine.



HON. JOSIAH K. BROWN, DAIRY COMMISSIONER OF NEW YORK.

## MR. BROWN'S ADDRESS.

*Mr. President, Ladies and Gentlemen:*

It affords me sincere pleasure to be with you on this occasion. In our State, there are being held about fifty Farmers' Institutes this winter, besides several butter conferences and other meetings of our farmers. I have never seen in New York anything like the zeal, energy and enterprise on the part of our dairymen and farmers displayed as is apparent now in our State.

This is due to the desire of our agriculturists to know more about their business, and a disposition to sink out of sight all differences, and unite as one man in the effort to secure all the knowledge possible, and employ all the means of improvement and instruction within their reach.

The result is that dairying and agriculture in general is making marvelous advances along the lines full of hope and promise.

The large amount of capital invested in the dairy business of this State will compare very favorably with that invested in your banks, railroads, insurance companies, and any other of the great enterprises in which capital is aggregated, and in the operation and management of which human skill, ingenuity and toil are severely taxed, in order that such undertakings may be made successful and profitable. If, to the prosecution of the dairy business in this or any other dairy State, was brought but a small percentage of the courage, enterprise and application of good business principles which are the *sine qua non* in all manufacturing, commercial and other such enterprises, it is safe to say that dairying would yield as large a profit in proportion to the amount of capital and labor expended in and upon each individual plant, as any other business in this country. In fact, I have almost concluded that

#### OUR DAIRYING BUSINESS IS THE BEST BUSINESS GOING,

All things considered, for the sufficient reason that there is no other business within my knowledge or observation that will afford even a moderate living, in spite of such needless drains and shocking wastes as the dairy business is too generally compelled to bear.

I am, of course, speaking from the standpoint of a New Yorker, somewhat acquainted with this branch of husbandry in that great dairy State. The condition of this industry in your State may easily be better than in New York, and I hope before I leave you, to learn something which I can carry back to my own State. and which will be helpful to the dairymen there. Everywhere the manufacturer is literally compelled to closely watch every piece of machinery in use in his establishment, and see to it that it is accomplishing all that can be done with the amount of labor and power employed, and must be quick to make all changes and apply all new and improved mechanisms, processes and methods, or before he knows it, his goods can not be sold at actual cost to him, while others engaged in the same line of productions, by close attention to their business, and



THE APPLICATION OF BETTER AND LESS EXPENSIVE METHODS, are able to undersell him at a profit, and easily have the control of all desirable markets.

Only that merchant can possibly succeed who gives to his business his closest attention, so as to be able constantly to push those lines which he knows are paying, and as promptly and certainly discontinue such as give him no profit. He must know his business perfectly, and knowing, must comply absolutely with the conditions which the needs and necessities of his occupation demand. It is as true, probably, here as elsewhere, that a very large proportion—at least one-quarter—of the cows in every dairyman's herd are unprofitable, and have not in the past year given milk enough to pay for the feed they have consumed. In the State of New York, I am satisfied, the proportion of unprofitable cows is even larger than twenty-five per cent. Such cows are maintained upon the farm, fed, housed, cared for and milked surely at a loss. No business man could long suffer such a loss in his affairs, and if he was heedless enough to allow his business to drift along with such a drain upon it, it is quite likely the Sheriff would make him an official visit, and that thriftless enterprise would be brought to a close. There are so many very poor and unprofitable cows kept among our herds that the general average of production is brought down to an astonishingly low figure.

#### THE AGENTS OF THE NEW YORK STATE DAIRY COMMISSION

Were sent out through the dairy Counties of that State during the past season, to visit the cheese factories and creameries, with a view of inspecting those institutions with reference to cleanliness, drainage, water supply, surroundings, expenses, etc., and of gathering statistics of the business of manufacturing cheese and butter at such establishments. Blanks were prepared for this purpose, and as each factory was visited and inspected, they were filled out and forwarded to the office of the Commission at Albany. Nothing has been undertaken in our State in many years which has furnished so much reliable information and disclosed such a lamentable state of things as these official visitations and inspections.

#### ONE THOUSAND ONE HUNDRED AND SIXTY-THREE FACTORIES WERE VISITED,

Carefully examined, the milk all examined and tested by our experts, and a full and faithful report made. It was found, as a rule, that the factories, with all the machinery, imple-

ments and appliances for manufacturing cheese and butter, were kept in good order, cleanly and unobjectionable. The water supply and drainage were good, and all the conditions favorable for the manufacture of products safe and desirable as articles of food. While at some of these factories it was found that one or two of the patrons were watering or skimming the milk, yet but a fraction of one per cent of that great body of milk was found to be below the standard, as fixed by our Legislature. At these 1,163 factories was delivered the milk of 407,810 cows by 30,746 different farmers or patrons. There were made 8,650,139 pounds of butter, requiring 216,253,475 pounds of milk, and 96,331,788 pounds of cheese, requiring 1,021,116,952 pounds of milk. The entire amount of milk received and manufactured into butter and cheese was 1,237,370,427 pounds. It will be seen from the foregoing, that the average amount of milk produced by each cow was only 3,034 pounds. These startling figures were gathered from forty different Counties of our State; and covering such an extensive territory and being obtained from such a large number of different sources, under conditions favorable as well as otherwise, it is perfectly safe to conclude that the average production is as large as that which the whole State would show, if every factory had been visited and every herd inspected. These cows gave some milk before the factories opened, and a small amount afterwards, but not enough to bring the average amount up to 3,500 pounds each. Our dairymen are perfectly satisfied if the average price of cheese for the year is ten cents per pound, from which there must be deducted for the necessary cost of manufacture, boxing, shipping, etc., about one and a half cents per pound, which would leave the farmer eight and one-half cents per pound net. It requires about 10 1-4 pounds of milk to make a pound of cheese. The income from our dairies, then, is not more than about \$28 per cow in the best of seasons, and will probably be much less than that the present year. Out of this small sum must be paid all the cost of living, labor and other necessary expenses of the business before anything is secured for profit. I sincerely hope you can make a better showing in this State, but I can not see why it should be so, and I greatly fear that if a census of the dairy business was carefully taken here, the result would not differ much from the unsatisfactory showing we make. Here, then, at the very threshold of our dairy business is met an obstacle which, in its very nature, absolutely prevents the pursuit of dairying from being at all profitable, or even remunerative enough to furnish a decent living for that class of agriculturists. I know this is not very flattering, nor altogether pleasant for the speaker, or those who listen; but many a merchant has

finally "gone to the wall," and failed, broken-hearted and ruined, because he had not the courage to make a careful and faithful inventory of his effects, and promptly face the figures and improve his business methods, before it was too late. That such a living as the hard-working farmer and his family deserve, can not be secured from such an income as a herd of average cows will furnish, will not be disputed. That all the bright boys, and girls, too, leave the farm for other pursuits, is no wonder. And that farms, especially such as are not yet quite paid for, are being abandoned by those who can possibly get away, and left to the care of those who are willing to doom themselves to a life-time of hard work for the common necessities of life, with few, if any, of the rational comforts and blessings which the average mechanic continually enjoys, is painfully apparent, even in our best dairy sections.

#### THE BUSINESS IS UNPROFITABLE.

Life is too short to waste many years upon a dairy farm, under existing circumstances. Can any thing be done to make this branch of farming more profitable, and herds more satisfactory? Certainly. Much less of that enterprise, push and indomitable energy requisite to make manufacturing or commercial pursuits profitable, if applied to dairying in wisely adapting means to ends desired, would make the business a remunerative, pleasant and satisfactory occupation. The first important thing to be done, is to

#### GET RID OF ALL THOSE POOR COWS.

Every cow in the herd which produces such a small quantity of milk as to offset a good cow, and help bring the general average down to a non-paying quantity, must be sold, given away, or got rid of *now*; not next spring, nor next month, but now, as soon as possible. Supply the places of such cows with better ones. There is not a single reason why the average production of all our herds should not be at least 5,000 pounds of good milk per cow. I now have reference to those dairy-men who patronize cheese factories, or sell milk to consumers. A single cow has been known to give more than 30,000 pounds of milk in a single year, and whole herds to average at least 10,000 pounds. I visited the farms of a firm of cattle breeders in Onondaga County, New York, and was shown a considerable number of two-years-old heifers, standing in a row, whose average production was something over 8,000 pounds each. So that it is not at all extravagant to assert that our dairy cows should make an average of at least 5,000 pounds of standard

milk. If it were necessary, in order to accomplish this desirable result, to purchase high-priced, thoroughbred cows, the situation would be more serious than it is now, but it is by no means necessary to incur that expense. There are, as a rule, some good cows in every herd, which should be retained. The farmer should then purchase a thoroughbred bull of the breed he desires, and place him in his dairy to head the proposed new herd. By adopting this plan, it will not be long before a paying herd will take the place of the old unprofitable dairy, and in the meantime, he will be saved the expense and trouble of maintaining a non-paying dairy, worrying through, year after year, in the pursuit of an unprofitable and discouraging business.

It is quite possible that the average cow will not produce more than 125 pounds of butter per year. The income from such butter cows is altogether too small. A cow that will not make at least 250 pounds of good butter is unprofitable, and the sooner she is disposed of the better. Those who would continue the business of butter dairying should have a herd of good butter-making cows. There are some butter makers in your State whose whole herds average more than 300 pounds per cow. Such a desirable result can be easily and certainly secured by an intelligent dairyman who will earnestly undertake it. There are those in this audience, I have no doubt, who fully agree with me thus far, and if so, it is manifestly the plain duty of dairymen to immediately begin the work of ridding their herd of unprofitable cows, and substituting for them, as rapidly as practicable, in each individual case, that kind of stock from whose production a satisfactory income may be realized. When good paying cows are placed upon the farm, the important work next in order is to see to it that they are comfortably housed, properly cared for, supplied with good, pure water of suitable temperature, plenty of salt, and with sufficient quantities of good, palatable, nutritious food, regularly fed in well balanced rations. The matter of feeding properly balanced rations to our cattle is of the utmost importance. There should be fed to our animals each day, about twenty-four pounds of dry matter to every one thousand pounds live weight, and this should always be in the proportion of about one part of nitrogenous to five parts of carbonaceous for milch cows, increasing the proportion of the carbonaceous when feeding fattening animals.

ONE-HALF OF THE CORN MEAL, AS FED BY TOO MANY FARMERS, IS DOUBTLESS WORSE THAN THROWN AWAY,

Because the ration as fed is by far too heavily carbonaceous or

heat-producing, so that the animal can not digest or assimilate its food, and therefore there is suffered a large loss. I have attended Farmers' Institutes in our State where whole sessions were profitably spent in discussing this matter of

#### FEEDING BALANCED RATIONS TO MILCH COWS.

After the frosts have injured the pastures, and winter approaches, some succulent food, such as roots or ensilage, should be provided, so that cattle may have summer food the whole year round. I believe there is no better food for cattle than good, sweet silage, made from fodder corn planted in hills or drills, and so cultivated that a crop of well-developed ears is grown, and then harvested and ensilaged at the time when the ears have reached about the glazing stage. Upon a single acre of fair corn land can be easily grown enough fodder to keep two cows a whole year, by adding a grain ration, which will yield a profitable return in the milk pail and butter tub. When cows are fed upon such succulent food, they will be more susceptible to cold, and much care must be taken to house them. The animal heat of the body must be maintained in some way, and those farmers who attempt to shelter their cattle on the north side of a wire fence will find it too expensive business, for an additional amount of heat-producing food must be furnished, or the animal will soon become unfit for any farmer's purpose. Wheat bran, middlings, linseed and cotton-seed meal are all exceedingly valuable to be mixed with a little corn meal, because they furnish the means of securing a properly balanced ration, and after the animal has taken out its twenty per cent of nutrition, the waste or manure furnishes the very best fertilizers for use upon the farm.

When our dairy farmers have cleared away the rubbish, and set themselves in order for maintaining upon their farms good herds of such productive and paying cows as I have described,

#### THE WHOLE ASPECT OF THE DAIRY BUSINESS

In this country will be changed, and dairy farming will immediately become a profitable, pleasant and satisfactory occupation.

In recent years there has risen, however,

#### A DANGEROUS AND DISHONEST COUNTERFEIT

Of the dairy product, and oleomargarine or bogus butter is openly and otherwise placed upon many of our markets, and the attempt is being made with more persistence than is gen-

erally supposed, to secure for this intruder a permanent place among us. Our experience in New York is, that statutes prohibiting or regulating the manufacture and sale of these bogus goods are of very little value, unless there is an officer designated and charged with the duty of causing them to be enforced. After a hard struggle of more than four years, we have succeeded in our State in closing up all the manufactories of oleomargarine, and driving from all our open markets all of those base imitations. Small sales are occasionally made in a clandestine way by the agents of manufacturers in other States directly to hotels and boarding-house keepers. But these sales are of small consequence, compared with the amount formerly and openly sold in all our markets. Doubtless, in ninety-nine cases, at least, out of every hundred, when sales of oleomargarine are made to consumers, the purchaser is deceived, and buys these goods for pure dairy butter. Laws to prevent such deceptions and frauds are in the interest of all the people of the State, and in no sense open to the objection of being class legislation. It is our experience that statutes providing for branding these goods are of little if any value, because the venders will not brand them, for the sufficient reason that to do so would prevent sales being made to those who bought for their own consumption. Prohibition of the manufacture or sale of these counterfeit goods is the only effectual remedy. A correct public sentiment now exists, and legislation is easily secured in many of the States and by the Federal Congress, intended, at least, to prevent fraudulent sales of these fraudulent imitations.

It is of vast importance that our dairymen be exceedingly careful to produce the best possible article; for the best friend they have is the consumer of dairy products. If our dairymen will only place upon the market choice goods, which will always command remunerative prices, I believe the business of dairying in this country can easily be made to be

#### A PROFITABLE AND SATISFACTORY OCCUPATION.

I congratulate the dairymen of Vermont upon this successful Convention. I shall go back to my own State long to remember with pleasure this very profitable meeting.

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“Commissioner Brown is one of the most efficient officers in the service of the State of New York.

“The establishment of the Dairy Commission in May, 1884, was a new departure in the State, and upon Mr. Brown, as the first appointed head of

the department, devolved the task of formulating a system of organizing the work of the Commission, and of training his assistants as to the details of the service. In all these respects Mr. Brown has been eminently successful. The object of the Legislature in creating the department was mainly to protect the health of the people, by preventing the manufacture and sale of spurious butter, and the marketing of poor milk. The dishonest dealers in dairy products, however, were strongly intrenched, and it has taken three years and over of incessant work and combat to destroy their business. The Courts have aided the department materially, and to-day—after two thousand prosecutions—no dealer is anxious to have a legal tussle with the State Dairy Commission. A great deal of expert work was done in the first year of Mr. Brown's term. The milk standard established by the Legislature was proved just, and the methods of analysis determined upon. In the second year the analytical work was continued, and the artificial color of oleomargarine was investigated until it could be detected. The third year of the Commission has been devoted especially to cheese investigations. The department is now thoroughly in working order. Much of Mr. Brown's success is due to his skill in judging of men. He has surrounded himself with a bright, enthusiastic and fearless corps of forty assistants, and has proved beyond a doubt the necessity which existed for the establishment of his office."

The "Vermont Watchman" says:

Some shrewdness was shown in keeping "the best of the wine for the last of the feast." J. K. Brown, Dairy Commissioner of New York, was by common consent the great gun of the whole campaign. In mature life, of fine address and appearance, of large practical experience and extended observation in the matters pertaining to dairy farming, he was a dairy school of himself. It was good management on the part of Secretary Bass to be able to get this heavy man from New York, and not have to ask "Jones to pay the freight."

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#### FRIDAY AFTERNOON SESSION.

The afternoon session commenced with answering the several questions propounded through the medium of the Question Box.

The questions were read aloud by Secretary Bass, in the following order:

*Q.*—Which is more profitable to raise, calves or pigs?

*Mr. Hastings*, of Passumpsic—That would depend entirely upon the market price of pork and of veal. I do not think any farmer should try to get along without a pig department.

Every farmer must raise his own cows. We can not go out into the market and purchase, and to get good cows, we must raise them.

*President Douglas*—I raise both. I have seventy-five hog kind, and I raise calves, too. In connection with the dairy, I know of no stock that pays so well as hogs. They are easily turned into cash, and at good, fair prices. I expect that one-third of my calves will remain in the herd. Those calves that I sell for veal do not bring as much profit as my hogs do.

• *Q.*—Are pigs profitable to raise?

*President Douglas*—That is partially answered in the last remarks. My hog property last year brought me in over \$500 in pork. Fall pigs sell for \$8.00 in the spring.

*Q.*—Who shall we sell our poor cows to, as we are all advised to get rid of them?

*Secretary Bass*—Sell them to the butcher every time. You should not impose upon your brother dairymen by trying to sell him the cows you have tested, and found to be unprofitable, even though they are thoroughbreds, with a long pedigree. There are worthless cows among every breed, and when they are found, they should be sent to the shambles.

*Q.*—What is the occasion of abortion in cows, and the remedy?

*Mr. Cheever*—The cause of it is too often a blow from a boot or from the milking stool. Accidental abortion caused in that way may result in an epidemic abortion among the herd. Aside from keeping the milking stool and boots where they belong, a cow so affected ought to be removed into a place by herself until recovered, and there will be less danger of the disease spreading.

*Q.*—How does it work to put grass in the silo?

*Dr. Hoskins*—It is reported as a success abroad. I don't know of any cases in this country.

*Prof. Cooke*—We have some samples that have been put into the silo, that came out in most excellent condition.

*Q.*—Was the grass put in whole or cut?

*Prof. Cooke*—Put in whole.

*Q.*—What is the cause of the death of so many pigs?

*A Voice*—The butcher.

*Mr. Cheever*—Feeding corn meal, or too rich feed to the old sows. The mothers should be kept without food, or given but a small quantity immediately following the birth of the pigs. For the first twelve hours, give only water.

*President Douglas*—I have found in my experience that I have lost pigs from what I call "black teeth." And I have operated on my pigs when they were sick, by removing the tooth,



or teeth, and the pigs have invariably recovered. I believe pigs have teething fits, the same as children do. The teeth are too brittle to pull out, and I break them off with a pair of nippers.

Mr. Perrin, of Berlin, and Mr. Sheldon, of Fairhaven, detailed similar experiences to that spoken of by President Douglas. In both cases they had saved young pigs by removing the black teeth.

Dr. F. H. Miller, of Burlington, was then asked to answer the question as to the cause of black teeth. He replied that it indicated a diseased condition of the stomach and digestive organs. I think the bleeding that followed the extraction of the teeth did more good than the taking out of the teeth. It is a symptom, not a cause. The disease is constitutional.

*President Douglas*—Suppose the young pigs were dying, and you found that this operation saved their lives, would you believe in continuing the treatment?

*Dr. Miller*—If the extraction had that effect, it would seem as if the treatment had been successful.

*Mr. Cheever*—In regard to the question as to whether pigs were profitable, I see in the last issue of the "Mirror and Farmer," the President of the New Hampshire Dairy Society stated that last year he raised 3,250 pounds of pork from skim milk and meal. The meal cost \$85.00; the balance was credited as profit from skim milk—\$158.75. That was from twelve cows.

*President Douglas*—As to feeding the mother when there are young pigs, I generally attend to the sow myself, and I let her go hungry for the first twenty-four hours.

*Dr. Miller*—It is better in all cases to feed under rather than over, just after parturition.

*President Douglas*—We will now listen to an address by Dr. F. H. Miller, of this city.

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## MAMMITIS, OR GARGET.

BY DR. F. H. MILLER.

*Mr. Chairman and Gentlemen:*

The subject I have chosen to bring before you this afternoon is one which I feel will be of interest to you all as dairymen, seeking to make a financial success of your most honorable enterprise.

There are but few here who can not call to mind his success or failure in treating this formidable type of inflammation.

Such is its frequency in all herds of dairy cattle, under every kind of management, from the worst to the best, that I do not for one moment hesitate to class it as second to none of the diseases (other than epizootics) financially detrimental to the pursuit.

Mammitis, as the name indicates, consists of an inflammation of the mammæ, or udder.

It arises from many causes, most frequently, however, from those local causes rather than systemic in nature. Owing to the exposed position and immoderate physiological and mechanical strain brought to bear upon this highly vascular organ, oftentimes when it may be the animal is under bad hygienic surroundings, you can not be surprised to find this most common trouble constantly under your observance, and should be in the best possible position to treat it upon scientific principles, which must, of necessity, be based upon a more or less thorough knowledge of the formation of the organ, and the different phases the disease may show, owing to the different structures involved.

#### DESCRIPTION OF GLAND.

Inflammation, although more commonly due to local causes, may be reflected from other parts of the body, as is seen in *milk fever* and other troubles.

Owing to the vast surface of mucous membrane contained in the udder, the inflammation is more or less catarrhal in nature, and once involved, generally leaves a predisposition to subsequent attacks.

It occurs in two forms. When located principally in the lining membrane of the udder, it is called catarrhal mammitis. When invading the gland structures proper, it is called phlegmonous or structural mammitis. Of course, these two forms verge more or less into each other in the great majority of cases.

Catarrhal, as such, is not marked by much pain or local inflammatory symptoms. About the only symptom noticed, is a separation of the milk into curd and whey, which is brought about by acid fermentation from mucous secreted by the lining membrane. Constitutional symptoms are developed, as a rule, only when it passes on to the phlegmonous form, with complications of the gland substances or framework.

This form, when developed, is extremely painful, owing to the swelling pressing on the nerve endings, and almost invariably throws the animal into a high general fever, which

only subsides with the local inflammation, which will, as other inflammations, end in one of three ways :

1. *Resolution*, or a gradual return to health, without functional or structural change.
2. *Induration*, organization of the products of inflammation, and permanent injury to both structure and function.
3. *Ulceration*, or a destructive change in the products, with formation of abscesses, which, breaking externally or internally, become troublesome, and render the animal useless.

The disease has a marked tendency to become chronic, and probably would do so in almost every case, if treatment be not early and proper. When so, it is always marked by structural changes.

We divide the causes into two kinds :

1. Idiopathic or constitutional. Such as exposure after parturition, reflection of inflammation from other parts, stocking the gland for show and market purposes, by allowing an abnormal quantity of milk to secrete before removal.

2. Traumatic causes,—direct injuries,—as being stepped upon in stable, laceration from any cause, and milking.

Anything capable of setting up inflammation is sufficient, and probably none more fruitful than the imperfect drainage by milking.

Milk in health is slightly alkaline, but if allowed to remain, becomes markedly acid, and acts as an irritant to the lining membrane, which soon spreads over the entire quarter.

The cells which are injured give a strong acid reaction, which greatly increases the trouble.

A full, plethoric state of the system is the great predisposing cause, and will, in part, explain why the best milkers are most liable to suffer, as is remarked by many.

Such animals have a heightened vascular and nervous development of the udder, corresponding to their excellency as milkers.

I need not explain in detail the symptoms of this trouble, as all have seen it. When the inflammation attacks the structure of the gland, it is known by the swelling, redness and pain, which is as a rule great, owing to the sudden tension put upon an already distended body.

Lactation, if not already checked by involvement of the secretory membranes, is soon checked through the nervous system. A high fever is soon caused by pain, coupled with the accumulation in the blood of matter naturally removed by the secretory power of the gland.

The successful treatment of this trouble in any form must be dependent upon general rather than local principles. While

local treatment is of great value, conjoined with those of a more general kind, in my opinion, it does not give the favorable and permanent effects we desire, when used alone.

#### BEST METHOD OF TREATMENT.

The method I find most trustworthy is based upon both mechanical and physiological rest of the gland. If the character of the secretion will allow, it should be carefully removed three or more times daily, with a small tube.\* Bathe the entire udder for one-half hour or longer in good hot water with a soft sponge.

Have a carefully-made and well-fitted canvas case made for the whole gland, with holes for the teats. Place over the udder and support around and above the hips, filling in with good, hot poultice, made of linseed meal or bran. Make your changes hot and often.

Give internally as follows :

Epsom and Glauber salts of each one pound ; ginger, three drams ; treacle, eight ounces ; water enough to dissolve.

Give from drenching bottle. If fever be very high, include about fifty drops of aconite, and clothe warmly.

Reduce the animal to dry food, with perhaps a small quantity of oatmeal given in sloppy form. Give plenty of cold water, adding one ounce of nitrate of potash each day, for three or four days. If necessary, repeat the laxative medicine each day until a good, free action is gained.

Many recommend anodyne liniments and oily applications. I have tried them, but find that heat and moisture well applied exceed the anodyne treatment, by opening up the superficial glands of the skin.

If the milk coagulates in the udder, much benefit may be derived from carefully injecting a little of the following into the teat or teats after milking :

Boracic acid, five grains ; water, one ounce.

I thank you, ladies and gentlemen, for your close attention, and hope you may find some little profit from my experience.

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\*" Professor Robertson says it is sometimes contagious. He has proven this by using milking tubes on healthy cows that had been used in gargety teats of others, and had thus produced garget within four hours. If a cow is predisposed to garget, a good preventive is to bathe the udder with warm water or camphorated oil. Care should be taken to avoid exposure to cold."

Upon the conclusion of the last paper, questions were asked as to the treatment of an affection of the cow's teat, which is first noticed by its being hard to milk, and the lower valve of the teat seems to swell, and often a quarter of the bag is lost by inability to draw the milk.

Dr. Miller said: The affection does not start as mammitis, though it may spread to inflammation of the glands. The treatment is the use of the tube. Do not try to pick the place, or puncture it, but insert the tube carefully, and thoroughly lubricate the parts with vaseline, and the tube also, before inserting it, and be careful to use a tube small enough. It is a wrong method to endeavor to milk by main force at such times. You run the risk of losing the use of the teat, or of more serious consequences.

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Mr. C. M. Winslow, of Brandon, was then introduced, and spoke on the following subject:

### BREEDING FOR THE IDEAL.

I have been asked frequently what I considered the ideal cow. I answer that question by saying that I consider the Ayrshire the best type of an ideal cow. Of course, every breeder has his own idea of what a perfect type and perfect ideal is, in his own mind, which he is striving to produce in reality. This applies to all classes of stock, but my remarks will apply particularly to dairy cattle.

The ideal dairy cow is no fancy type, simply for ornament. It is a matter of no small importance to dairymen in Vermont to produce cows which will pay them a dividend. A large proportion of dairy cows are an expense to farmers, instead of a profit; they run the farmer behind. Therefore, he should only produce cows that will be profitable to him.

If Vermont farmers and dairymen would take suitable measures to see that their herds were composed only of cows that paid a dividend, the hard times in the dairying business would be at an end.

### THE CHIEF THINGS TO CONSIDER IN BREEDING

Are breed, feeding and selection. Breeding has been going

on for centuries, and I don't know when it first began, but we will come to the principal breeds of cattle now in the world.

#### THE JERSEY BREED.

This breed, produced on the Island of Jersey, was bred for butter purposes. It was bred to meet the requirements of the English market, which demanded a graceful, beautiful cow, and the inhabitants of the Island have striven for years—perhaps more than a century—to produce what the British market wanted, which was ever varying with the demand.

#### THE HOLSTEIN COWS

Were bred for entirely different surroundings and requirements, in luxuriant fields and with abundance of succulent food; reared with care to their comforts, and kept in a place adjoining the house in the winter. They have come down to the present time a large cow, a wonderful milk producer when well fed on succulent food. The Jersey is different; she has a good digestion, and while giving less in quantity, it is rich in cream and butter.

#### THE GUERNSEY IS ANOTHER COW BRED FOR BUTTER,

Originally the same as the Jersey. By the laws of the Island of Guernsey, prohibiting the importation of other breeds, the Guernsey has been kept very pure in breed, and very uniform.

#### THEN THERE IS ANOTHER BREED OF DAIRY CATTLE,

Originating in the County of Ayrshire, Scotland. The inhabitants of the County of Ayrshire are a dairy people, and get their living from their cows; from butter, cheese, and milk, which this breed of animal gives in the largest proportions from the food consumed. The Ayrshire cow has a wonderful digestion; it is a breed that will always pay to keep. It is entirely different in appearance from the other three. The Ayrshire cow is a medium sized cow, larger than the Jersey, and smaller than the large Guernseys, (though I have seen Guernseys no larger than Ayrshires), and smaller than the Holsteins.

#### THE DIVISION OF THESE CLASSES

On the basis of production would be, Holstein for cheese; Ayrshires for butter and cheese, and Jerseys and Guernseys for butter. No matter for what some specimens of these breeds may be noted, the average of the breed is what regulates the value and reputation of the animal.

There is another class of breeds of cattle; those are

#### THE NATIVE STOCK.

That is what I wish to talk about—how to produce our native cattle, so that we shall have a profitable breed of cattle from our native stock.

Sometimes the taking of a full blood of one kind and crossing it with the full blood of another breed is tried. Such experiments are liable to result in nothing at all. Instead of improving the breed of either, or combining their qualities, it most often produces a deteriorated specimen, and an animal unlike either of the parents. The progeny is apt to go clear back, and resemble an animal as it was before centuries of work had been undertaken to improve the breed. It might be possible to take Holstein cows and Jersey bulls, and after a long course of judicious breeding, produce something which shall be like one or the other, but what advantage would it be? The Devon men have been

#### BREEDING FOR BEEF;

So have the Short-horns, and to-day the largest part of their stock is beef stock.

In handling Hereford cattle, I have found a cow that showed a marked type of dairy cow, and many of them can be brought into dairy stock. In breeding, the best plan is to keep to a uniform type, and

#### STICK TO ONE BREED.

Do not cross the breeds. You cannot take an animal that has for a long time been bred as a beef animal, and expect to make it a dairy type. You don't all want blooded stock; bring up your native stock to a high standard. In every herd of native stock there is a sufficient number of cows for a nucleus; cows which pay a revenue and produce a dividend. A man should have an ideal type in his mind; if he wishes cows for their milking qualities, let him take those which have for long generations been fed for that specific purpose. If it is butter he desires,

#### TAKE THOSE THAT HAVE BEEN BRED FOR BUTTER,

And so with cheese, if that is what he wants.

There are enough herds of thoroughbreds so that he can get a thoroughbred bull—do not buy a grade, and do not breed from a grade bull. When you have in your mind the type you

wish, change the breed, point by point, just as the Merino sheep has been bred, wrinkle by wrinkle. After you have made up your mind what you wish to produce, stick to it until you find you will not succeed,—but you will succeed. Then,

#### WEED OUT YOUR POOR COWS,

Until you have reached the highest standard, and increase your produce. Select your bulls having a line on both sides, running back to stock that have been producers.

You were shown yesterday a simple method of testing milk; apply some such test, set down accurately what each cow gives. This will give you a basis to work upon; then test your milk to learn as to its quality. You will find some cows you supposed your best, or most likely, are not worth keeping. It will cost you very little to make the experiment; purchase your apparatus, and send to the Experimental Station for your blanks. The Secretary has blanks, and he told me he would be glad to send to any dairyman in the State of Vermont a copy free of charge. When you do this, you will soon find you can hire men to do what you do not want to do; dress your families better, travel, and enjoy more of the pleasures of life, but until you carry out

#### THE PRINCIPLES OF FEEDING, BREEDING AND SELECTION,

You never will. There is no business in the world that pays like dairying when well cared for.

I can show you men in Pomfret with herds of grade stock that are paying them a good dividend. They know what they are breeding, and they are making money.

I am not talking about blooded stock. That is another feature. I am speaking about what any of you can do. By the introduction of bulls, you can produce this class of cows in your own herds. Weigh your milk; sell off your stock that does not pay; you can better afford to do it than to keep them. After you have obtained your thoroughbred bulls, then comes

#### THE RAISING OF CALVES.

Commence with your calves, and train them up as you would train up the cows, with good care and good feed—such as will produce bone, muscle and strength. It is worth a great deal to have a calf raised up so that when she becomes a cow she shall have a good digestion, and a good receptacle for food, so that she will go to work and give you a revenue.



In regard to Ayrshire cows, I will give my experience. I began with a herd of Ayrshires about fifteen years ago. I bought a bull and four heifers. I had a herd of native stock, and was selling milk in town, and when I could hear of a native cow that produced a large quantity of milk, I bought her for a large price, and bred on to them Ayrshire bulls. From that time I raised my best calves from native stock and Ayrshire stock, and sold out those cows which, on the experiment of test, were the poorest, whether Ayrshire or natives. I determined my herd

SHOULD BE A DAIRY HERD ;

That I was working that herd for my living—for my support—and the cow that should do the best was the best cow for me, regardless of other matters. I did not know whether I would have an opportunity to sell blooded stock ; did not know whether they were good for anything, but I knew the best cow was paying me the best. In ten years the Ayrshires had driven out every grade cow in my herd, and for the last ten years my cows have been thoroughbred Ayrshires.

In regard to the butter—I sell milk, and have the reputation of selling good milk, and the way I have done it is by weighing the milk morning and evening, and periodically testing my cows for butter. I tested them, not in as good a way as illustrated to you yesterday, but I took the milk from one cow, and set it and churned it, and figured the average for the week. It was not absolutely correct, but it approximated. I found it was my poorest cow for butter, and I sold it.

For the last nine years my herd averaged 300 pounds of butter, or over 3,000 quarts of milk ; and a pound of butter to twenty-two pounds of milk.

In my opinion, the Ayrshire is the ideal cow for the average farmer who wishes to make general farming his business.

*Mr. Newton*, of Dummerston—I should like to inquire if any one here has experimented in the heating of water, or warming of it for stock, and what apparatus to use.

*Prof. Cooke*—As to the use of heating apparatus, I can not speak from experience. I do not think warming the water is of much utility when the cows are properly cared for. When they are in cold stables, or are left out in the yard, the giving of warm water might supply animal heat that is lost by not keeping the animals warm. They must otherwise have their animal heat kept up by extra feeding, to carry on digestion and the other vital processes.

*Mr. Newton*, of Dummerston—In other words, warm water is a substitute for battenning up your barn ?

*Prof. Cooke*—Yes. It may be that I am all wrong, but that is just my own private belief.

*Mr. John Gould*—I found my cows would not drink so much warm water as they did cold water. I tried warm water, but did not get any increase in milk; I found a temperature of about forty-eight degrees to be much preferred to ice water, but I think it poor policy to warm it up to seventy-five degrees or eighty degrees for cows kept in a warm stable. I did not get as much gain with feeding warm water as satisfied me it was a success. It was not an accurate experiment, however.

*Mr. Sanford*, of Orwell—I used warm water for the cows, and think it did them good; but I had my doubts, at the end of two years, whether it paid or not. I think farmers had better warm their barns, and dispense with hot water and warming apparatus.

*Mr. Sanford*—On this question of feeding rations—is there any way that we can know at once when we are feeding improper rations? Suppose a man has two good cows—one he feeds well balanced rations, and the other improper rations—will not the one improperly fed wear out quicker than the one that has the proper ration?

*Prof. Cooke*—It is supposed that when you feed a cow a ration not properly balanced, you are feeding part of that ration at a loss. It is so much worse than waste in the system, 'it clogs it until she gets rid of it. It is undoubtedly an injury to the system, if it is an excess of muscle producing food, but it does not naturally draw on the vital energies of the animal to get away with the surplus of heat producing material, but would endanger a fever.

*Commissioner Brown*—If you would have the most economical results from your feeding, it should be a well balanced ration, for this reason, in addition to many others, only from such a ration is the animal able to make the best possible use of the elements in the ration.

*Mr. John Gould*—I have enjoyed meeting with this Association very much, and hope to be with you again.

As there was no further business to transact, the Association then adjourned *sine die*.

#### SEEKING FOR LIGHT.

The "New England Homestead" says:

The eagerness for information manifested was something marvelous. When some of the speakers had the floor, a pin could have been heard to fall, and this for more than an hour at one time. Between sessions the people wanted nothing better than to cluster about the various teachers and ply them with questions.

John Gould was born in Summit County, Ohio, in 1844, of Vermont parentage, has always lived on a farm, and lives on one yet, in the same County in which he was born. His education was that of the common schools, and his farm work has been that of the dairy, chiefly. Though yet half-a-dozen years on the sunny side of fifty, he has twice had the experience and satisfaction of going in debt for a farm, and making the farm pay for itself, achievements of which he is deservedly proud. When but twenty-six years old, he became a staff writer on the "Cleveland Herald," and afterwards its agricultural editor. Later, he was chief dairy writer for the "Ohio Farmer," and has for several years been a valued contributor of dairy matter to several of the leading farm papers, both East and West.

It will be seen that when the Farmers' Institutes were organized in Ohio, in 1882, Mr. Gould was well equipped to become one of the lecturers, and he engaged in this work for three successive winters, traveling all over the State. In the winter of 1885-6, Wisconsin developed great activity in the Institute work, and Mr. Gould became an active worker in this, continuing through every season since, and during the last winter was Assistant Superintendent, with a separate corps of instructors and lecturers. Mr. Gould was Secretary of the Ohio State Dairyman's Association, and is a Vice-President of the International Dairy Fair Association.

Though thus largely engaged in the public work, which of late years has become one of the most important duties of the progressive and well-informed farmer, Mr. Gould personally directs his own large farm interests, and enjoys his cozy home, where a handsome and accomplished wife, who is as proud of her farmer husband as he is of her many graces, dispenses a generous and winning hospitality.

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## NOTES ON DAIRYING.

BY PROF. JAS. W. ROBERTSON, ONTARIO AGRICULTURAL COLLEGE,  
GUELPH, CANADA.

The business of dairying, when intelligently and carefully followed, insures to the farmer a safe and steady income. As the permanent success of the dairy industry depends upon the quality of the product, every dairy farmer is, or should be, interested in its improvement. To help in that direction is the purpose of these notes. In producing and supplying milk to cheese factories and creameries, the following points require attention, in order that the best results may be obtained:

### GENERAL RULES.

1. Milk from healthy cows only should be used, and not until at least four days after calving.

2. Any harsh treatment that excites the cow lessens the quantity and injures the quality of her yield.

3. Cows should be allowed an abundant supply of wholesome, suitable food, and as much pure water as they will drink.

4. A supply of salt should be placed where cows have access to it *every day*.

5. Cows should not be permitted to drink stagnant, impure water, nor to eat cleanings from horse stables, leeks, turnip tops, nor anything that would give the milk an offensive taint.

6. All milk vessels should be thoroughly cleaned; first being well washed, scalded with boiling water, and afterwards sufficiently aired to keep them perfectly sweet.

7. Cows should be milked with dry hands, and *only after* the udders have been washed or well brushed.

8. Milking should be done and milk should be kept only where the surrounding air is pure and free from all objectionable and tainting odors. Milking in a foul-smelling stable or yard imparts to milk an injurious taint. Sour whey should never be fed, nor should hogs be kept in a milking yard nor near a milk stand.

9. Tin pails only should be used.

10. All milk should be properly strained immediately after milking, and for that purpose a detached strainer is preferable to a strainer pail.

#### FOR CHEESE FACTORIES.

11. In preparing milk for delivery to a cheese factory it should, immediately after straining, be thoroughly aired by pouring, dipping or stirring. This treatment is as beneficial for the morning's milk as for the evening's, and is even more necessary when the weather is cool than when it is warm.

12. In warm weather all milk should be cooled after it has been aired, but not before.

13. Milk kept over night in small quantities—say in tin pails—will be in better condition than if kept in larger quantity in one vessel.

14. When both messes of milk are conveyed to the factory in one can, the mixing of the morning's with the evening's milk should be delayed till the wagon reaches the milk stand.

15. When the milk is warmer than the surrounding air, it should be left uncovered, but when colder, it may with advantage be covered.

16. Milk pails and cans should be protected from the rain ; and milk stands should be constructed to shade the cans from the sun.

17. Only honest milk with its full cream and full share of strippings should be offered ; violation of this requirement leaves the patron liable to a heavy penalty.

#### FOR CREAMERIES.

18. In preparing milk for delivery once a day to a creamery where the whole milk is received, the treatment should be similar to that recommended for cheese factories.

19. For creameries receiving cream only, the milk should be well aired but not cooled before setting.

20. Milk should be set for the separation of cream, where no impure air will reach it.

21. Cream rises best with a falling temperature, and the separation of cream from milk is promoted by cooling, after setting, to at least forty degrees Fahrenheit.

#### FOR BUTTER MAKING AT FARM DAIRIES.

22. When the cream is used for butter making at the farm, the foregoing treatment and conditions may be observed with profit :

23. Good ventilation for a milk-house, milk-cellar or dairy room is most essential, and may be provided for by leading an air drain under ground, for, say two hundred feet. Through it a supply of pure, fresh, cool air may be admitted. The foul, or warm air may be allowed to escape through ventilators or windows in or near the ceiling.

24. Cream should invariably be removed from the milk before the milk is sour.

25. The cream for each churning should be gathered into and kept in one vessel.

26. The whole of the cream should be well stirred every time fresh cream is added.

27. In summer, cream should not be left longer than three days before churning, and should be slightly soured.

28. The best churning temperatures are between fifty-seven degrees and sixty degrees, during the summer, and sixty degrees and sixty-four degrees during the winter.

29. Butter can be more thoroughly washed free from butter-milk while in the granular condition than after it is gathered or pressed into a roll.

30. Only the best pure salt of medium and uniform fineness of grain should be used, and from three-quarters to one ounce of salt per pound of butter will be found satisfactory for the summer.

31. The utmost cleanliness in milking, in vessels, in utensils, and in all surroundings must be observed to preserve the flavor and body of milk, cream, butter and cheese from contamination.

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#### HINTS ON CHEESE MAKING FOR CHEESE MAKERS.

1. Use every endeavor to educate your patrons how to produce milk of the best quality, with the most profit.

2. Give each one a copy of "Points for the Attention of Patrons of Cheese Factories."

3. Carefully inspect the milk cans, especially the seams inside the covers, once every week; any offensive matter appearing yellow when wet with milk is most dangerous to the flavor and keeping qualities of the cheese.

4. Insist on a careful straining immediately after milking.

5. Send a circular or note to every patron two or three times a year, urging care in the airing of all milk.

6. Visit promptly the farm, pasture, stable, milking-yard, milk-house and milk stand of every patron whose milk comes tainted, after he has been notified of its bad quality; some apparently trivial matter that has escaped attention will generally be found as the cause.

7. Where whey is returned in the milk cans, urge the owners to empty them as soon as received, and not to feed the whey near a milk stand, milking-yard or other place where milk is kept.

8. Examine carefully the inside and outside of the opening from the weighing can into the milk conductor; and just after using look into the conductor very closely for any traces of the yellow matter referred to in No. 3.

9. Do that every day.

10. Entertain a "creepy dislike" for the use of a strainer, cloth, dipper, pail or thermometer which feels greasy, or that has a miser's store of matter-out-of-place in the corners.

11. Lift the pans of the milk vats out of their places for a thorough cleaning of the water-pans once a fortnight.

12. Eighty-four or eighty-six degrees Fahrenheit are satisfactory setting temperatures when the milk is in good condition.

13. Over-ripe or acid milk may with advantage be set as high as ninety-six degrees, according to the degree of its ripeness. See also 31.

14. Let the milk be well matured by the retention or application of heat before the rennet is added.

15. If the milk is delivered to the factory in too sweet a condition, it should at once be heated to ninety-four degrees and frequently stirred.

16. According to the degree of its sweetness it may be left to gradually cool down to eighty-eight degrees during two to four hours.

17. The addition of sour whey to hasten the maturing is most objectionable, and should never be resorted to.

18. Old milk, which has become well ripened, and nearly sour to the taste, may be added, but loppered or thick milk should never be used.

19. In the use of coloring, the annatto extract should be diluted to the extent of one gallon of water to every vatful of milk, and then thoroughly stirred in.

20. Pure rennet extract or powder of *known* strength is indispensable.

21. The quantity used should be regulated according to the condition of the milk.

22. Rennet should be diluted to the volume of at least one gallon of liquid for every vat before being added to the milk.

23. The first discernible action of rennet is to coagulate the milk into curd.

24. To perfectly coagulate the milk from fresh calved cows, more rennet is required than later in the milking season.

25. The more rennet there is used, the more moisture will there be retained in the cheese under similar conditions of making.

26. The more moisture there is retained in the cheese, the more quickly will it cure under equal conditions of temperature and atmosphere.

27. For spring cheese, as much rennet should be used as will thicken for cutting in from fifteen to twenty minutes, at a temperature of eighty-six degrees.

28. For summer and fall cheese, forty-five minutes should be allowed for the same process, with milk in good condition.

29. The second evident action of rennet is to effect a separation of moisture out of the curd particles.

30. The raising of the temperature up to ninety-eight degrees Fahrenheit, provides increasingly favorable conditions, and thus promotes the rennet action.

31. When milk is over-ripe or acid, a proportionately increased quantity of rennet should be used to effect a sufficient separation of the moisture from the curd (often termed "cooking,") before the presence of lactic acid is perceptible to the taste or smell, or is discernible by the hot iron test. See also 13.

32. Observation of the foregoing would remedy many so-called mushy curds, and avoid the danger of leakers.

33. Rennet should be diluted to the volume of at least one gallon of liquid for every vat before being added to the milk.

34. It should be thoroughly mixed by vigorous stirring, otherwise coagulation will be very imperfect.

35. The results of late investigations recommend an allowing of the curd to become fairly firm before commencing to cut, except in the case of a quick curd.

36. More moisture is retained in the cheese, and a better yield is thus obtained. See also 26.

37. The horizontal knife should be used first, lengthwise, and then followed by the perpendicular knife, crosswise, after the whey has separated to half cover the curd.

38. The mesh of the knives should be so close that three cuttings would suffice, except in the case of a quick curd, which should be cut unusually fine.

39. The knives should be moved fast enough to prevent much disturbance of the curd by pushing.

40. After coagulation is perfect, the curd should be cut finer during the late fall than during the summer months.

41. Gentle and slow stirring should begin immediately after the cutting is completed.

42. The hand should be used to free the sides and bottom of the pan from any curd that may have adhered.

43. The application of heat should be delayed for fifteen minutes after stirring is commenced.

44. The heat should be applied through the medium of warm water, to avoid scorching of the curd.

45. The temperature should be gradually raised to ninety-eight degrees Fahrenheit, at a rate not faster than one degree every four or five minutes.

46. In the case of a quick curd, Nos. 43 and 45 may be disregarded.



47. Pains should be taken to make the curd particles so dry, before the development of acid is perceptible, that after being pressed in the hand and released, they fall apart when slightly disturbed.

48. Stirring should be continued until the curd is properly "firmed" or "dried."

49. The temperature should be maintained at ninety-eight degrees until the whey is drawn off.

50. When the hot iron test shows fine hairs, from one-fourth to one-eighth of an inch long, the whey should be removed.

51. If acid is discernible by the hot iron test before the curd is so properly "firmed," the whey should be immediately removed and the stirring continued till that firm condition is brought about.

52. In both cases the dry curd should be kept at a temperature above ninety-two degrees Fahrenheit.

53. The presence of too much moisture in the curd *while the acid is developing* is the cause of tenderness of body and pastiness in cheese.

54. If the temperature be allowed to fall below ninety-two degrees, the development of acid is retarded, and excessive moisture is retained in the curd during its development.

55. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak or pasty or tallowy body, according to the degree of acid development permitted.

56. A rack placed in the vat seems the simplest and most effective provision for keeping the curd warm, without risk of scorching.

57. Just after the removal of the whey the curd should be hand-stirred till the free moisture has drained off.

58. *After the curd is dry or firm enough, but not before*, it may be allowed to mat into one mass.

59. It should be frequently turned and packed close, till the layers of curd are four or five deep.

60. Whey should never be allowed to gather in small pools on the curd at this stage.

61. The close packing in layers four or five deep, with frequent turnings, prevents the outside of the matted pieces from becoming chilled or more deeply colored than the rest of the curd.

62. The conditions of the curd, as to when ready for cutting and salting, are best ascertained by the use of the senses.

The usual order of reliability for that purpose is by touch, smell, taste and appearance.

63. The proper degree of change has taken place when the curd feels mellow, velvety and greasy ; smells like new-made butter from sour cream ; tastes aromatic rather than sour, and shows a texture passing from the flaky or leafy into the stringy or fibrous.

64. When the curd is gasey or very porous, souring should be allowed to go further before it is arrested by the cutting and salting.

65. If the curd be too moist or soft, it should be cut or ground at a rather earlier stage, and hand-stirred some time before the addition of salt.

66. In both of those cases, it should also be well aired by stirring before being salted.

67. It is generally beneficial to stir the curd for ten minutes after cutting or grinding before the salt is applied.

68. The results of the tests made last season (1886) for the Western Ontario Dairymen's Association, indicate that Canadian salt is better for cheese-making purposes than English salt.

69. One pound and three-quarters of pure salt per 1,000 pounds of milk is a maximum quantity for April and early May cheese.

70. From two pounds to two and three-quarters pounds of salt per 1,000 pounds of milk is the range for summer use on fairly dried curds, and from three pounds to three and one-half pounds during October and November.

71. Where extra rennet has been used, or where the curd is sloppy, a corresponding increase of salt should be applied.

72. One important action of salt is to dry the curd and cheese, and thus retard the curing.

73. The curd should be hooped and pressure applied within twenty to forty-five minutes after the salt is stirred in.

74. Delay at this stage, or coldness of curd destroys the desirable rosy flavor, and imparts to the cheese the bitter taste of the salty white whey.

75. Immediately after the application of salt, the pieces of curd become harsh and gritty on their surface ; then in from fifteen to twenty-five minutes, the harshness gives place to mellowness, and the salt causes the whey to separate freely.

76. Pressure in the hoops should be continuous, at first light, and gradually increasing.

77. The followers should be loose-fitting, and canvas press rings used.

78. Particular care should be taken to use only pure, warm water when turning the cheese for bandaging, before the rinds are fully formed.

79. Greasy water is sure to percolate into the body of the cheese and leave nasty flavors.

80. The curd-cutter or grinder must be thoroughly cleaned every day; wretchedly bad flavors are frequently sown into cheese from neglect of this.

81. Curd sinks should be furnished with racks having slats bevelled to an edge from both sides.

82. The racks need thorough scrubbing on both sides every day, and should be turned out for airing over night.

83. A sink cloth that shows clogging by yellow matter should be burned at once.

84. Occasional soaking over night in a strong sal-soda solution is beneficial.

85. The curd whisk has been a fruitful scatterer of bad flavors; a hair brush is more easily kept clean.

86. The hoops and press tables require to be rinsed with hot water every day, and scrubbed on both sides.

87. All cheese should be turned in the hoops in the morning, to give finish to the shape and body.

88. The press cloths should be left on for a fortnight, or till within a few days of the time of shipment.

89. No cheese should be taken to the curing room till the shape is true and the edges well made.

90. The cheese should be turned on the shelves once a day till at least three weeks old.

91. The curing room floor should be frequently swept, the shelves thoroughly cleaned after each shipment, and the air kept pure by suitable ventilation.

92. The curing is effected by fermentation, while heat up to seventy degrees makes a favorable condition, and cold under sixty degrees an unfavorable condition for its operation.

93. A temperature of from seventy degrees to seventy-five degrees Fahrenheit should be maintained for curing spring cheese.

94. From sixty-five degrees to seventy degrees Fahrenheit is the best range of temperature for the curing of summer and fall cheese.

95. In the curing room a temperature of from sixty-five degrees to seventy degrees should be maintained continuously.

96. Where the room is heated by a stove, the following simple device will help to equalize the temperature over the whole, and save fuel :

97. A tin jacket should be placed so as to surround the stove at a distance of eight inches all around.

98. Let the jacket stand eight inches from the floor, and extend eight or twelve inches above the stove, according to its size.

99. A light rope attached to the jacket and then passing around a pulley fixed to the ceiling will provide for its being lifted out of the way when fresh fuel is being added.

100. The air between the stove and the jacket on being heated at once ascends ; the colder air from below is drawn up, and a continuous movement of warm air along the upper part of the room is established away from the stove, with the complementary circulation of colder air, near the floor, towards the stove.

101. When press cloths are stripped off, use warm (but not hot), pure, sweet-flavored grease on the rinds.

102. Just before boxing summer cheese, grease them, and apply scale-boards while the grease is still soft.

103. Mark the weight of each cheese in neat figures on the hollow side of the box.

104. Let there be two scale-boards on each end of the cheese in the box.

105. The edge of the box should be level with the cheese, and the cover should fit close.

106. The band of the box cover should be at least one-fourth of an inch thick, to give additional strength to the package.

107. Insist on the teamsters using only clean wagon or sleigh boxes in which to take cheese to the railway station.

108. See that the flues of the steam boiler are cleaned out every week.

109. *Finish all of every day's work each day, in the very best way you can.*

110. Keep everything in and about the factory scrupulously clean.

111. Keep a correct and detailed record of every day's make.

112. Occasionally compare the working of your factory in all its details with the foregoing recommendations.

## SUNDRY FEEDING RATI<sup>ONS</sup>.

### NEW YORK.

Ammonia is 14-17 nitrogen. To ascertain the amount of nitrogen in a given percentage of ammonia, multiply by 14 and divide by 17.

Albuminoids are 16 per cent nitrogen. To find the nitrogen, divide the albuminoids by 6 1-4.

A pound of fat will make 2 1-2 times (nearly) as much heat as a pound of sugar, starch or other carbohydrate. Always remember this in computing the nutritive ration.

If your stables are warm, you can economically feed a ration richer in albuminoids than the standards given.

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This leaflet is prepared by the Cornell University Agricultural Experiment Station to illustrate the talks on stock feeding made by members of the staff at Farmers' Institutes.

### SUNDRY FEEDING RATI<sup>ONS</sup>.

The standard per day and 1,000 pounds live weight are :

For Maintenance, . . . . .	17 lbs. Dry Matter.	Nutritive Ratio, 1:12
For Milk, . . . . .	24 " " "	" " 1:5.4
For Milk, (warm stables), . . . . .	23 " " "	" " 1:4.5
For Fattening Oxen, . . . . .	26 " " "	" " 1:5.5
For Fattening Sheep, . . . . .	25 " " "	" " 1:4.5
For Fattening Swine, . . . . .	31 " " "	" " 1:6
For Growth, Young Cattle, . . . . .	24 " " "	" " 1:6

In order to get 24 pounds of Dry Matter from 30-33 pounds, air-dry fodder must be used.

### MAINTENANCE RATI<sup>ONS</sup>.

20 lbs. Timothy Hay, . . . . .	Dry Matter, . . . . .	17.3
	Nutritive Ratio, 1:12.7	
Or 70 lbs. Good Ensilage, . . . . .	Dry Matter, . . . . .	16
	Nutritive Ratio, 1:12	
Or 75 lbs. Oat Straw, . . . . .	Dry Matter, . . . . .	13.6
4 lbs. Wheat Bran, . . . . .	Dry Matter, . . . . .	3.5
		<hr/> 17.1
	Nutritive Ratio, 1:12	

## FOR MILK.

10 lbs. Brewer's Grains, . . . . .	Dry Matter, . . . . .	2.31
4 lbs. Cotton Seed Meal, . . . . .	" " . . . . .	3.75
8 lbs. Wheat Bran, . . . . .	" " . . . . .	7.08
70 lbs. Corn Silage, . . . . .	" " . . . . .	10.79
Total, . . . . .		23.90
Nutritive Ratio, 1:5.2		
Or 10 lbs. Clover Hay, . . . . .	Dry Matter, . . . . .	8.74
10 lbs. Oat Straw, . . . . .	" " . . . . .	9.04
10 lbs. Roots, . . . . .	" " . . . . .	1.2
1 lb. Corn Meal, . . . . .	" " . . . . .	.9
3 lbs. Cotton Seed Meal, . . . . .	" " . . . . .	2.75
4 lbs. Bran, . . . . .	" " . . . . .	3.5
Total, . . . . .		26.13
Nutritive Ratio, 1:5.3		
Or 20 lbs. Corn Fodder, . . . . .	Dry Matter, . . . . .	13.59
4 lbs. Cotton Seed Meal, . . . . .	" " . . . . .	3.66
6 lbs. Bran, . . . . .	" " . . . . .	5.26
2 lbs. Corn Meal, . . . . .	" " . . . . .	1.8
Total, . . . . .		24.31
Nutritive Ratio, 1:5.2		

## FOR GROWING CALVES.

15 lbs. Timothy Hay, . . . . .	Dry Matter, . . . . .	13.34
20 lbs. Ensilage, . . . . .	" " . . . . .	3.91
2 lbs. Oil Meal, . . . . .	" " . . . . .	1.78
1 lb. Oats, . . . . .	" " . . . . .	.87
1 lb. Corn Meal, . . . . .	" " . . . . .	.9
4 lbs. Bran, . . . . .	" " . . . . .	3.5
Total, . . . . .		24.30
Nutritive Ratio, 1:6.6		

## FOR FATTENING SWINE.

30 lbs. Corn Meal, . . . . .	Dry Matter, . . . . .	26.64
6 lbs. Oil Meal, . . . . .	" " . . . . .	5.35
Total, . . . . .		31.99
Nutritive Ratio, 1:6		

For convenience in compounding rations, the following table has been arranged. It shows the number of pounds of digestible albuminoids and the number of pounds of digestible carbohydrates and fat equivalent to carbohydrates, in each 10 pounds of the various substances. That is, the fat has been multiplied by 2 1-2 and added to the carbohydrates.

	Dry Matter.	Albuminoids.	Carbohydrates plus fat multiplied by 2½.
	lbs.	lbs.	lbs.
10 lbs. Clover Hay, . . . .	8.74	.78	4.40
10 lbs. Timothy hay, . . . .	8.89	.37	4.38
10 lbs. Corn Stalks, . . . .	8.04	.24	3.56
10 lbs. Oat Straw, . . . .	9.04	.14	4.43
10 lbs. Wheat Straw, . . . .	9.35	.08	3.91
10 lbs. Ensilage, . . . .	1.95	.11	1.23
10 lbs. Barley, . . . .	8.91	.96	6.54
10 lbs. Oats, . . . .	8.90	.85	5.59
10 lbs. Rye, . . . .	8.84	.84	6.59
10 lbs. Corn, . . . .	8.95	.84	8.66
10 lbs. Brewer's Grains, (wet),	2.50	.40	1.33
10 lbs. Malt Sprouts, . . . .	8.97	1.88	5.51
10 lbs. Cotton Seed Meal, . . .	9.17	3.57	5.14
10 lbs. Linseed Meal, (N. P.),	8.92	2.83	3.50
10 lbs. Wheat Bran, . . . .	8.76	1.17	5.13
10 lbs. Gluten Meal, . . . .	9.18	2.33	6.05
10 lbs. Potatoes, . . . .	2.5	.21	2.23
10 lbs. Sugar Beets, . . . .	1.85	.10	1.70
10 lbs. Carrots, . . . .	1.5	.14	1.30
10 lbs. Turnips, . . . .	.8	.11	.64

## MANURIAL VALUE OF FODDERS.

In general only from 10 to 20 per cent of the manurial value of a fodder is made use of by the animal. That is, the value of the manure if it is all saved, is about 80 per cent of the value of the fodder as a fertilizer. In the following table the value of 10 pounds of different fodders for manure after 20 per cent has been taken out is shown. Nitrogen is reckoned at 17 cents per pound, potash at 4 1-2, and phosphoric acid at 7.

10 lbs. Brewer's Grains, Manurial Value, . . . .	\$ .013084
10 " Red Clover Hay . . . .	.036516
10 " Spring Barley, grain, . . . .	.027612
10 " Potatoes, . . . .	.007368
10 " Turnips, . . . .	.004140
10 " Corn Meal, . . . .	.023828

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10	"	Cotton Seed Meal,	. . . . .	.109530
10	"	Young Grass,	. . . . .	.013024
10	"	Wheat Bran,	. . . . .	.050900
10	"	Malt Sprouts,	. . . . .	.067544
10	"	Oat Straw,	. . . . .	.011884
10	"	Wheat Straw,	. . . . .	.010028
10	"	Oats,	. . . . .	.031168
10	"	Peas,	. . . . .	.057032
10	"	Timothy Hay,	. . . . .	.020000
10	"	Sugar Beets,	. . . . .	.004028
10	"	Ensilage,	. . . . .	.004860
10	"	Linseed Oil,	. . . . .	.075088
10	"	Buckwheat Bran,	. . . . .	.048024
10	"	Corn Stalks,	. . . . .	.012952
10	"	Field Beans,	. . . . .	.066868

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For illustration the manurial value of the third ration for milk given above would be per day and 1,000 pounds live weight :

20	lbs.	Corn Fodder,	. . . . .	\$ .025904
4	"	Cotton Seed Meal,	. . . . .	.043812
6	"	Bran,	. . . . .	.030540
2	"	Corn Meal.	. . . . .	.004765

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.11

The market value of the ration at present prices would be :

20	lbs.	Corn Fodder at \$5.00 per ton,	. . . . .	\$ .05
4	"	Cotton Seed Meal at \$25.00 per ton,	. . . . .	.05
6	"	Bran at \$20.00 per ton,	. . . . .	.06
2	"	Corn Meal at \$20.00 per ton,	. . . . .	.02
				—
				.18



KIND OF FOOD.	Dry Matter in 100 lbs.									
	Albuminoids in 100 lbs.									
KIND OF FOOD.	Carbohydrates in 100 lbs.									
	Feeding Value in Ton.									
KIND OF FOOD.	Manurial Value in Ton.									
	Total Value per Ton.									
KIND OF FOOD.	Average Cost per Ton.									
	Feeding Profit per Ton.									
KIND OF FOOD.	Feeding Loss per Ton.									
Cotton Seed Meal.....	91.70	35.70	51.40	\$45.00	\$24.00	\$69.00	\$28.00	\$41.00	\$	
Linseed Meal.....	89.20	28.30	35.00	30.80	18.55	59.35	26.00	33.35		
Pea Meal.....				30.60	14.25	44.85	22.00	22.85		
Wheat Bran.....	87.60	11.70	51.30	20.40	11.03	31.43	17.00	14.43		
Middings.....				20.00	8.00	28.00	17.00	11.00		
Clover Hay.....	87.40	7.80	44.00	15.40	7.80	23.20	8.00	15.20		
Meadow Hay.....				12.40	7.37	19.77	8.00	11.77		
Timothy Hay.....	88.70	3.70	44.58	12.40	4.20	16.60	10.00	6.60		
Corn Fensilage.....	19.50	1.10	12.30							
Corn Stalks, (dry).....	80.40	2.40	30.56	7.80	3.00	10.80	6.00	4.80		
Oat Grain.....	89.00	8.50	55.90	19.00	6.60	25.60	22.00	3.60		
Barley Grain.....	89.10	9.60	65.40	19.00	6.70	25.70	22.00	3.70		
Wheat Grain.....				22.60	7.00	29.60	30.00			
Oat Straw.....	90.40	1.40	40.43	9.40	3.06	12.46	2.00	10.46		
Wheat Straw.....	93.50	.80	39.10	7.80	3.20	11.00	2.00	9.00		
Potatoes.....	25.50	2.10	22.30	5.80	1.44	6.24	8.50			
Turnips.....	8.00	1.10	6.40	2.20	1.05	3.25	3.00	.25		
Corn Meal.....	89.50	8.40	86.60	20.60	5.00	25.60	20.00			

Manurial value is reckoned—Nitrogen at 17 cts. per lb., Potash at 4 r-2 cts. per lb., and Phosphoric Acid 7 cts. per lb.

Feeding value is reckoned—Albuminoids and Fats at 4 r-3 cts. per lb., and Carbohydrates at 9-10 of a cent per lb.

## SECRETARY'S REPORT.

The dairymen of Vermont are to be congratulated that the present outlook for the dairy business is as bright as it is. There is no department of agriculture so remunerative, and none which so little depletes the fertility of the soil. When butter sells at 25 cents per pound, \$200 may be realized without disposing of any more plant-food than is contained in a single bushel of wheat; or, in other words, 800 pounds of butter contain less than 24 cents worth of nitrogen, potash and phosphoric acid.

In a series of experiments just reported from the Massachusetts State Experiment Station, it appears that "The total value received above net cost of feed and of cow consists in every instance in a *controlling degree* in the manure obtainable."

2. As the value of the manure depends in a *controlling degree* on the amount of fertilizing constituents contained in the feed, it becomes apparent that this point ought to be seriously considered when selecting the feed for our dairy cows.

It is folly to feed corn meal and corn meal only to supplement hay, because it makes a poorly balanced, and hence a wasteful ration. They both are deficient in albuminoids, and cotton-seed, linseed, gluten meal or bran are needed to make up this deficiency. By adding these materials, rich in albuminoids, we may not only secure a properly balanced ration, but materially add to the value of the manure. The foregoing tables may prove of great value if properly studied and applied.

While the price of butter may be lower than in years gone by, we should not grumble about hard times, for we are learning to produce it more cheaply, by keeping cows that give a greater return for food consumed, and also to feed more economical rations. We are learning that butter, as a general rule, can be more cheaply made in the creamery than at home, and of better average quality. With all deference to the opinions of our excellent butter judge, I beg leave to differ with him, if he is correctly reported, that "Good dairy butter gives better satisfaction than creamery butter." Not more than two per cent of the dealers of my acquaintance would agree with this statement; though, of course, we all know there are dairies whose product far surpasses that of any creamery in the country; and the "Mirror and Farmer" is to be commended for giving the methods used in these prominent New England dairies, where 50 cents per pound and over is received for the butter; but these are so rare as to pass out of the class of *good*, and are known only as FANCY OR GILT EDGED.

Mr. H. K. Slayton, of Manchester, N. H., when reporting as judge of the Dairy Exhibit at Hanover, stated it as his opinion that the greatest lack in the dairy business of Vermont and New Hampshire, was that of *creameries*. He was born and brought up in Washington County, Vermont, and for many years bought all his butter there, but of late his son has bought five hundred tubs of Western creamery butter to fifty tubs of Vermont or New Hampshire dairy; and while he considered that we had made great progress during the last twenty-five years, a much greater progress had been made in the newer States of the West. This is not a statement that we relish, but if it be true,

#### WE OUGHT TO WAKE UP

To the possibilities before us. In this age of sharp competition, it means the "survival of the fittest," and it is high time that we *know* in regard to each cow in the dairy whether she is giving us a profit or a loss. There has been too much guesswork in the past, and right here I want to call attention to the fact that "In 1890 every farmer in the United States will be visited by a paid officer of the government, and asked to give the statistics of his farm crops, stock, etc., for the previous year, *which is the present one, 1889*. To be prepared for the census taker, begin now to keep accurate account of all farm operations, and keep it up through the year. In this way only can the agricultural statistics of the Census Report have any real value."

#### OLEOMARGARINE.

"Oleomargarine is deservedly having a hard road to travel. What was not accomplished to make it sell on its own merits, or rather demerits, by national legislation and by placing it under control of the Internal Revenue Department, will sooner or later be done by the States. Some have already passed stringent laws to regulate the manufacture and sale of it. Others will soon do so," and it was recommended by some of the Senators who defeated the three oleomargarine bills in our last Legislature, that a bill be carefully drawn by a committee appointed by this Association, and presented to the next Legislature; and while I was disposed to favor the suggestion, I should also favor the election of those Senators *to stay at home* next time, for if we have a right to expect any thing from those we send to represent us, it is that we be protected from this robber who masquerades in the semblance of butter. I would call attention to what Mr. John Gould has well said on pages 61 and 62 of this Report—and I wish that every dairyman in the Green Mountain State might have heard him.

I know of no spot on this globe, unless it be the Channel Islands, where the dairy interest is more vital to the prosperity of its inhabitants than in Vermont. England is said to have one cow to eight and one-half persons; France, one cow to three and one-third; America, one cow to two and two-thirds, and Vermont one cow to one and one-half persons. No other State approaches us in the proportion of cows to population. and no other has, to a greater degree, the prime essentials for superior quality and cheap production, coupled with nearness to the best markets.

#### THE DAIRY EXHIBIT.

One of the most unsatisfactory features of our Burlington meeting was the meagre response to the large premiums offered for butter and cheese, and the "Mirror and Farmer" fitly commented, as follows:

Vermont, known all over the world as an excellent dairy State, should be ashamed of the meagreness of the dairy exhibit it made this winter. Considering the time of year, the quality of the samples shown was generally quite good, and in several instances exceptionally fine, but that only sixty lots of butter and nine cheeses should have been exhibited speaks strongly and unmistakably of a lack of something or other, be that something inclination, interest or get-up-and-get-ativeness, in the make-up of the Green Mountain dairymen. There ought to have been five hundred samples of butter contributed, and more than a hundred cheeses. Butter and cheese-makers ought not to be timid about sending specimens of their work to a State Dairy Show. Cowards never win anything. It is those who have for their motto, "Be bold! Be bold! and everywhere be bold!" who achieve success. If you have butter or cheese at an exhibition, you will learn more at that exhibition than you would under other conditions, for you will feel a deeper interest, ask more questions, make more and closer comparisons between products and methods, than would otherwise be the case. We hope that Vermont will never again do herself such numerical discredit in dairy matters as she did this year.

#### FUNDS.

The membership fees amounted to \$61.00, or 50 per cent more than last year.

Expense of Burlington Meeting.....	\$ 473 80
Incidentals, and Traveling Expenses of Secretary.....	126 31
O. S. Bliss, Bill with Interest.....	29 28
Premiums on Butter and Cheese.....	195 82
Printing 4,000 Reports.....	250 00
	<b>\$1,075 21</b>

There is a balance in the treasury of \$74.79.

A considerable part of this amount will be required in the distribution of these Reports, so that the funds remaining with which to hold a Dairy Conference is only enough for a nucleus.

I am so confident of good results from Dairy Conferences that I am willing to contribute largely towards defraying the expense of the first one, that one, at least, may be held in this State this year. Mr. F. D. Curtis, of Kirby Homestead, (New York), could be secured without very great expense, especially if the Conference was to be held in the west part of the State. He is of large experience, and a whole team in himself.

An invitation has been extended to hold a Conference at Passumpsic, but it appears that much greater expense would be incurred there than at or near Middlebury.

We have striven to accomplish the greatest good to the dairymen of the State, and not a dollar of the fund received from the State or membership fees is being appropriated for salary of any of its officers.

We have received from the former Secretary, Mr. O. S. Bliss, the original Records and many copies of the early Reports, (about six hundred pounds). Of the Annual Reports, there are none for the second year, and only about a dozen for the third and fourth, but for the first, fifth, sixth, seventh and eighth, there are a much greater number. There are ten copies of No. 9; this brings us to the year 1878; and from this time to 1883 there was very little published of the transactions of this Association, and this little is only to be found in the Reports of the Board of Agriculture. Of the Reports for 1883-84 I have twenty copies; for the years 1885-86 and 1888-89, there are about forty copies.

There is valuable matter in all of these Reports, and we shall be pleased to distribute them to those who may apply, enclosing stamps sufficient for postage on the same.

We hope to see at the next annual meeting, a much greater number of

#### YOUNG MEN WITH THEIR WIVES,

For it is to them that we look for the practical application of new ideas, and, in a word, to carry on "*The kind of dairying demanded by the times.*"

E. L. BASS, *Secretary.*

# CHICAGO GLUTEN MEAL

## For Milch Cows,

**I**S the Most Wholesome and Profitable Feed on the Market. It is the Flint or Yellow Portion of Corn, Kiln-Dried, with all the Hull and Waste Part taken out. It Produces a Large Flow of Rich Milk.

It is Fed on the STATE FARMS at Burlington, Vt., Hanover, N. H., and Amherst, Mass.

*For Particulars Address,*

**BUTLER, BREED & Co.,**

10 Broad Street, Boston, Mass.

General Eastern Agents,

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## TO FARMERS

### →\* ABOUT \* SALTING \* STOCK \*

By the old way of Feeding Soft Salt some cattle get more and some less than they require. Large quantities of the Mineral are now taken from the RETSOF SALT MINES, in Piffard, N.

Y., over 98 per cent. Pure. With a lump in the manger and in the pasture, Stock will lick it Daily.

*Full Information From,*

**BUTLER, BREED & Co.,**

10 Broad Street, Boston, Mass.

Agents For Retsof Salt Mining Co.

# TO CREAMERYMEN❖

— ❖ AND ❖ —

# ❖ BUTTER MAKERS.

**T**HE practice of artificially coloring butter has become a necessity in every locality, both at home and abroad, where butter is made for market, but owing to the many kinds of Color used by Creamerymen and Dairymen in the United States,

## THOUSANDS OF DOLLARS ARE ANNUALLY LOST !

By not keeping up the standard of excellence in this very important item that is required by expert buyers. A demand for more uniform color and one that more accurately represents the natural June shade has not only increased, but the art of manufacturing this delicate article for the dairy has INCREASED WITH WONDERFUL RAPIDITY AND SKILL. The undersigned have twenty-five years in unremitting investigation and study, employing the skill of the chemist in his laboratory, coupled with the searching eye of the microscopist in ascertaining the

## TRUE COMPOUND OF NATURAL JUNE BUTTER,

**A**ND the substances wanting in white butter at other seasons, and by the same untiring skill and application we are able to furnish the butter-maker with the artificial requisite, so that at all seasons of the year he can supply his market with butter so near the June shade that it is impossible for the SHREWDEST EXPERT TO DETECT THE DIFFERENCE. We have had letters from Boston and New York buyers and shippers, asking us TO SEND SAMPLES OF OUR COLOR TO THEIR PATRONS, stating that their (patrons) product would be enhanced two or three cents per pound by the use of

## THATCHER'S ORANGE BUTTER COLOR.

EVERY PACKAGE WARRANTED TO GIVE SATISFACTION.

## THATCHER M'F'G CO.,

Potsdam, N. Y.

# CHR. HANSEN'S LABORATORIES,

COPENHAGEN, DENMARK,

LITTLE FALLS, N. Y., AND 17 DEARBON ST., CHICAGO, ILL.

## 92 FIRST-CLASS MEDALS.

### CHR. HANSEN'S

Rennet Extract, Rennet Tablets, Cheese Color and  
BUTTER COLOR.

The leading Butter and Cheese-Makers seem to prefer our goods. They have found out their UNIFORMITY, PURITY and STRENGTH, and they are satisfied that our Butter and Cheese Color give a Bright Straw Color, not that Dull Red Brick color so common in the cheap or home-made colors. All we ask is a FAIR TRIAL by those who have not yet tried our preparations.

If your Dealer does not keep them, send to us or MESSRS. D. H. BURRELL & CO., Little Falls, N. Y., for Price List and Circulars.

Have you tried

## HANSEN'S \* JUNKET \* TABLETS?

If not, write us, and we will send you a Sample Free of Charge. One of these Tablets converts a quart of new milk into a Delicious Dish of Junket.

+ 12 \* TABLETS \* FOR \* 15 \* CENTS. +

CHR. HANSEN'S LABORATORY,

LITTLE FALLS, N. Y., AND 17 DEARBON ST., CHICAGO, ILL.



# PLEASE READ

## Facts for Milk Handlers.

Some time ago I placed a sample No. 1 Aerator at the disposition of E. L. Bass, Secretary of The Vermont Dairymen's Association, asking that it be thoroughly tested on its merits—conclusions not to be jumped at—but directions for use carefully followed. The machine was placed in charge of Prof. W. W. Cooke, Director of the Agricultural Experiment Station at Burlington, Vt. I present copy of his letter to Mr. Bass reporting results.

BURLINGTON, VT., MARCH 2, 1889.

Mr. E. L. Bass:

West Randolph Vt.

DEAR SIR:

Hills Milk Aerator has been tested at the Station and found to DO WHAT IS CLAIMED FOR IT in the line of taking out ANIMAL ODORS and OTHER BAD SMELLS that may have gotten into the milk.

We tested it in this way: A lot of milk was set into the silo and allowed to stay there a long time, until it SMELLED and TASTED very strongly of the silo. It was then Aerated and NOT A PARTICLE of SMELL or ODOR could be detected in the milk. Then another sample was taken and suspended in the BARN CELLAR right UNDER THE FLOOR on which the cows stand, where the air was as BAD as air COULD BE MADE, and even THESE vile odors were ENTIRELY TAKEN OUT by running air through the milk a short time with the Aerator.

Then, at another time, a lot of milk was put into the silo and after standing for some time was DIVIDED, ONE HALF AERATED and the OTHER NOT. BOTH LOTS of milk were then set in the COOLEY CANS, skimmed and the cream churned. The SAMPLE from the AERATED MILK was NICE, SWEET BUTTER, far from any suggestion of bad odor. The other sample TASTED and SMELLED VERY PERCEPTIBLY of the ENSILAGE.

Yours Truly,

W. W. COOKE.

Complete Catalogue Mailed on Application.

E. L. HILL, Patentee and Mfr.,

West Upton, Worcester Co, Mass.

# STOCKBRIDGE SPECIAL, COMPLETE MANURES.

## THE ORIGINAL SPECIAL FERTILIZER.

*The best substitute for stable manure,  
And for some crops positively better;  
There being no decaying organic matter  
To foster the germs of disease.*



Taken from a photograph of a field raised by G. W. P. Jerrard, of Caribou, Me., on Stockbridge Potato Manure.

## STOCKBRIDGE POTATO MANURE.

**P**OATATOES make the best part of their growth in sixty days; they must grow quickly and continuously to be good, and a potato fertilizer, therefore, must be an active one, containing plant food ready to act, not only at the start, but gradually throughout the season. The Stockbridge Special Potato manure combines not only all the elements required for an average yield, but supplies these elements in forms best suited to the potato crop, and potatoes grown on it are invariably good, being *smoother and more mealy, and less likely to rot than those raised on stable manure.*

The **SPECIAL** for Grass Top-Dressing is **EQUALLY MERITORIOUS.**

**BOWKER'S**


## HILL AND DRILL PHOSPHATE

Is giving Great Satisfaction and is Becoming More and More Popular Every Year.

**BOWKER FERTILIZER CO.,**

43 Chatham St., Boston, Mass.

**CHAS. DOLE, General Agent, Northfield, Vt.**

 In answering Advertisements Mention the Vermont Dairymen's Report.

# FOR SALE!

Thoroughbred Registered Ayrshire Cattle; also Yorkshire and Berkshire Pigs.

L. S. DREW,

Burlington, Vt.

## AYRSHIRES,

BRED FOR EXTRA DAIRY QUALITIES.

Average Weight of Milk for Nine Years 6868 Pounds.

Average Weight of Milk for One Pound of Butter, 22 Pounds.

Average Weight of Cows 1072 Pounds.

**YOUNG STOCK FOR SALE.**

C. M. WINSLOW, Brandon, Vt.

MOYER'S

## Improved Shipping Case or Carrier

For Print Butter.

Pat. Nov. 29, 1887

TEN  
POINTS



OF  
Superiority.

This latest and best invention of its class was made by a man having long experience in the wholesale and retail butter trade and it overcomes objections common to all old style cases.

CREAMERIES AND DAIRYMEN who aim to lead, will consult their own and customers' interests by using the best.

☞ Circulars free. Write for them.

Address, M. A. HICKS & CO., Weathersfield, Vt.  
Sole Manufacturers.

Order early as we shall build but a limited number this season.

☞ In answering Advertisements mention the Vermont Dairymen's Report.

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### UNBIASED JUDGMENT.

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The late PROF. L. B. ARNOLD, of Rochester, N. Y., the well known and best American dairy authority, and who had no personal or pecuniary interest in any brand of salt, visited England in the summer of 1886. In a paper read before the New York State Dairymen's Association, in the following December, he said :

"One thing which I very much wished to ascertain, if possible, while in England, was whether there is anything or nothing upon which to base the claim of excellence made for English dairy salt."

After a free and close inspection of the Salt Works of MR. THOMAS HIGGIN, Cheshire, the proprietor accompanying him and satisfactorily answering all questions, PROF. ARNOLD concludes :

"No CHEMICALS or anything else are used in the process [of manufacture] TO VITIATE, or in any way MODIFY, the NATURAL PROPERTIES of salt. Its claim for purity rests on the naturally pure condition of the brine, its FREEDOM FROM PAN-SCALES, and its UNIFORM CONDITION. After examining every detail of its manufacture, I BECAME SATISFIED that the 'Eureka' Salt is JUST WHAT IT CLAIMS TO BE—a *very clean, pure and honestly-made* salt, uniform in quality, and in as good condition for dairy purposes as any salt ever offered to the public."

Notwithstanding the purity of English brines, no other brand of English salt can truthfully claim freedom from pan-scales. MR. HIGGIN frees his salt from these by using a process of his own invention, for which the English government has granted him letters patent, and no other manufacturer has a right to use it, nor does any one use a process that accomplishes the same purpose. By its unquestioned merit, therefore, Higgin's "Eureka" Salt stands at the head of all English and American dairy salts—the latter being unreliable because of the difficulties and dangers of the process of purifying the brines.

"*Eureka*" Salt is endorsed by PROF. PORTER, of the Minnesota Agricultural College; PROF. W. A. HENRY, Wisconsin Agricultural Experiment Station; PROF. WING, Nebraska Agricultural College; PROF. J. W. SANBORN, Missouri Agricultural College; PROF. S. A. KNAPP, Iowa Agricultural College; PROF. I. P. ROBERTS, Cornell University, N. Y.; DR. E. L. STURTEVANT, New York Agricultural Experiment Station; MAJ. H. E. ALVORD, Massachusetts Agricultural College; and by thousands of the best dairymen in the United States and Canada.

→\*STODDARD\*←

→\*SURFACE SKIMMING CREAMERY.\*←



BEST FOR USE IN  
PRIVATE DAIRIES →\*←

BEST FOR USE IN  
→\*← BUTTER FACTORIES.

←BEST→

Because \* Most \* Convenient, \* Securing \* Best \* Results.

**S**URFACE Skimming is endorsed by all as the only means by which Sediment in Cream can be avoided, and the best evidence of the popularity of this device is the frantic endeavors of competitors to so construct Creameries that they may avail themselves of the well-deserved popularity with which the Stoddard Surface-Skimming Creamery is being received.

We are furnishing the Most Complete Outfits for Private Dairies, as well as Butter and Cheese Factories, and will gladly mail Estimates and all necessary Information on application.



Sectional view of can, showing Skimmer in operation

**THE STODDARD CHURN.**

The Most Perfect on the Market,  
As Attested by Sales.

Made in NINE SIZES for FACTORY OR DAIRY.

With or without Pulleys.

The Principle is Concussion and not Friction. Has no Floats or Paddles. Cover removed instantly. Has Best Fastener Made.



→\*SHORT'S \* METHOD\*←

FOR ACCURATELY DETERMINING

THE BUTTER VALUE OF MILK.

FOR THE EAMERY, CHEESE FACTORY AND THE FARMER.

Don't pledge your Milk or Cream to anyone till you know they are supplied with apparatus which will determine the exact value of your milk or cream, giving to each patron his just due.

**MOSELEY & STODDARD M'F'G CO.,**  
**POULTNEY, VT.**

# Do You Make Butter?

---

IF YOU DO

CONSIGN IT TO

Noyes, French & Fickett,

36 and 38 Commerce St., BOSTON.


REFERENCES, { CENTRAL NATIONAL BANK.  
METROPOLITAN NAT'L BANK.

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## THE AMERICAN CREAMERY.


Every reader of this advertisement should send for a sample copy of "THE AMERICAN CREAMERY." It is devoted to the interests of the creameries of America, and is chock full of reliable dairy information. It is issued monthly, is a large sixteen page paper, with a subscription price of only 50 cents per year.

The "AMERICAN CREAMERY" makes a specialty of Creamery Printing and will be glad to furnish prices on anything from a business card to a two sheet poster. Copyrights on five different styles of Creamery Checks. Say on what system your Creamery is run and send for sample of check.

 Say where you saw this advertisement.

Address, THE AMERICAN CREAMERY, Holly, Mich.

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 In answering Advertisements mention the Vermont Dairymen's Report.

## MILWOOD FARM, Framingham, Mass.

GUERNSEY CATTLE, HAMPSHIRE AND  
HORNED DORSET SHEEP OF ALL  
AGES FOR SALE.

**E. F. BOWDITCH.**

## HOARD'S DAIRYMAN.

A Weekly Journal,

Especially devoted to the DAIRY and DAIRY STOCK INTERESTS.

**SUBSCRIPTION PRICE ONLY \$1.00 a Year.**

Send for Specimen Copies, which will be sent Free. Advertising Rates  
Furnished on Application.

**W. D. HOARD, Editor and Publisher.**

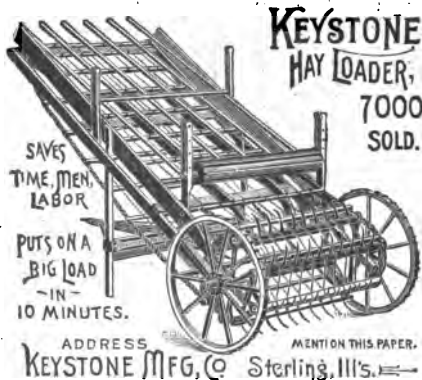
Fort Atkinson, Wis.

## IT WILL PAY YOU!

To send for Full Descriptive Circular of the Improved "Keystone" Hay Loader. It is fully warranted to be Strong, Durable and to do Good Work.

Our Ensilage and  
Corn Drill is Largely  
Used by Dairymen.

Send for our  
Large Catalogue.



In answering Advertisements mention the Vermont Dairymen's Report.

Use  
 Elliot's  
 Parchment Paper  
 If You Desire the Best  
 And Most Effective Wrapper  
 For Your Fine Butter. **TRY IT!**  
**CHEAPER, SWEETER and CLEANER**  
 Than Cheese Cloth With its Threads  
 or Wax Paper with its Poor and  
 Often Unpleasant Coating.  
**A. G. ELLIOT & Co.,**  
**PAPER MANUFACTURERS,**  
**Rose Glen Paper Mills,**  
**Philadelphia,**  
**Pa.**

### THE CHEAPEST PLACE

In the Country to buy Milk and Cream Testing Apparatus, both for Dairy and Creamery use, Revolving Barrel Churns, Scales and novelties in Dairy Supplies.  
 Circulars for Stamp.

**W. L. EDSON,**  
 Union Center, N. Y.

**"OIL TEST CHURN"**  
 With six glasses \$ 2 00  
**FREE BY MAIL.**



## F. H. MILLER,

Veterinary Surgeon.

GRADUATE MONTREAL VET. COLLEGE.

HONORARY FELLOW MONTREAL VET. MED. ASSOCIATION.

VETERINARY SURGEON TO SHELburne FARMS.

CALLS PROMPTLY ATTENDED.

TELEPHONE CONNECTIONS.

OFFICE 110 CHURCH STREET,

**BURLINGTON, Vt.**



# National Life Insurance Co.,

MONTPELIER, VT.

INCORPORATED 1850.

Assets Jan. 1, 1889, \$5,194,112 29 Insurance in Force, \$32,312,303 00

CHARLES DEWEY, President,

EDWARD DEWEY, Vice-President,

GEO. W. REED, Secretary,

J. C. HOUGHTON, Treasurer,

O. D. CLARK, Assistant Secretary,

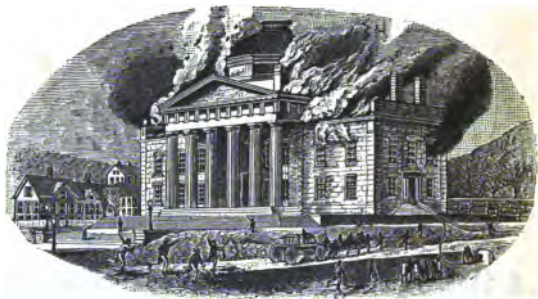
E. W. BISBEE, Medical Director.

✦ ISSUES ALL APPROVED FORMS OF POLICIES. ✦

The Instalment Bond, issued only by the "National," and the Life Rate Endowment Plan, are original with this Company.

In answering Advertisements mention the Vermont Dairymen's Report.

# UNION MUTUAL Fire \* Insurance \* Company.



MONTPELIER, VERMONT.

ORGANIZED 1874.

**Premium Notes in Force, \$380,000**

This Company pays no Dividends on Capital, and no Large Salaries, but it INSURES all kinds of Insurable Property at the Lowest Possible Cost to the Insured. It insures Live Stock while anywhere on the farm against Lightning.

**All Losses Promptly Settled and Paid.**

**Agents Wanted in Towns Not Represented.**

W. G. FERRIN, *President.*

M. M. CUTLER, *Vice-President,*

JOHN H. SENTER, *Secretary.*

HARLAN W. KEMP, *Treasurer*

# THE SWEEPSTAKES WINNERS

AT THE NINETEENTH ANNUAL MEETING OF THE VERMONT  
DAIRYMEN'S ASSOCIATION

## SPEAK OUT!

### DAIRY SWEEPSTAKES AND GRAND SWEEPSTAKES.

"I have tried all the different kinds in the Market, and find that the Butter Color as now improved and manufactured by WELLS, RICHARDSON & CO., is excelled by none in strength, keeping qualities, and that peculiar shade which gives to butter the fresh grass tint of early spring.—GEORGE ATKIN, Manager Billings Farm, Woodstock, Vt., Jan'y 30, 1889.

### CREAMERY SWEEPSTAKES.

"I am pleased to speak a good word for your Improved Butter Color. It is in every respect right. Previous to the meeting of the Vermont Dairymen's Association at Burlington on Jan. 16th, I had been using the Danish coloring, and here a very funny accident developed a fact favorable to your interest and secured to me, as I believe, the first prize and creamery sweepstakes. I had been using a given amount of this Danish coloring to each day's churning, which had uniformly produced 150 to 152 pounds of butter. On the day before the meeting of the Association I decided to try your Color, and measured out the exact amount I had been using of the Danish for 150 pounds of butter.

On turning this butter from the churn, you can imagine my surprise and alarm at finding 177 pounds. (There had been an increase of milk not reported to my butter-maker.) But after working and standing the usual time, as fine a color was developed as one need ask for. At any rate, it took the cake, whereas, if I had used the usual amount of the Danish coloring I should have got left."—A. D. EVARTS, Vergennes, Vt.

## ALL THE FIRST PRIZES TAKEN


BY USERS OF

## Wells, Richardson & Co's. Improved Butter Color.

Important changes in machinery and processes, adopted in the summer of 1888, make WELLS, RICHARDSON & CO.'S Improved Butter Color the strongest, the most natural, and the only reliable color. It will not turn acid. It will not color the buttermilk. Sold everywhere.

**WELLS, RICHARDSON & CO., Proprietors,**

**Burlington, Vt.**

 In answering Advertisements mention the Vermont Dairymen's Report.

**FOR Greater Prosperity**  
**TEST YOUR COWS** BY **Shorts Method**  
for their Butter Value. Send for full particulars to  
**Cornish, Curtis & Greene,** **Fert Atkinson,**  
**Wis.**

— THE —

**Watchman Publishing Company,**  
**MONTPELIER, VT.**  
**Book, Pamphlet and Commercial Printers.**

**FINE WORK AT LOW PRICES.**

— **ONE OF THE LARGEST AND BEST EQUIPPED OFFICES IN THE STATE.** —

**PUBLISHERS OF**

**THE VERMONT WATCHMAN.**

The Leading and Oldest Family and General Newspaper in Central Vermont.

**ARTHUR ROPES, Gen'l Editor.**

**Dr. T. H. HOSKINS, Ag'l Editor.**

**P**UBLISHED at the State Capital, the Political and Business Center of the State, THE WATCHMAN enjoys advantages not possessed by papers in other localities.

Its Agricultural Department, for Vermont Farmers, is BETTER than any other New England Paper provides.

**TRIAL SUBSCRIPTION, Three Months, - - 50 Cts**

This Company also publishes the VERMONT CHRONICLE and the HAMPSHIRE JOURNAL, organs of the Congregational Churches of Vermont and New Hampshire respectively, their aggregate circulation affording one of the best advertising mediums in northern New England.





